Rob Roggema *Editor*

The Design Charrette

Ways to Envision Sustainable Futures

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Foreword

A plethora of design professionals, planners, landscape and other architects, and even lawyers, have all struggled to cut through the planning morass to make urban design more participatory and the outcomes meaningful, useful, practical, elegant, beautiful and enjoyable.

We have watched, silently and noisily, as great ideas flounder in a sea of failed hopes. Unloved, dreary proposals, lacking vision and stifling humanity's best selves, continue to inexorably find their way through the pack. They keep delivering 'own goals'.

People who are expected to live in sites, precincts, houses and developments for years, and sometimes for their whole lives, continue to be little more than ancillary to the places which they will inhabit. Their choices are constrained, their interests ignored and their imaginative suggestions, if ever proffered or heard, are sidelined or spurned.

The challenges of designing and developing elegant, simple, realisable, solutions to planning and housing and community problems are exacerbated over time. Isolated pockets of innovation are celebrated as unique and we all complain about our inability to grasp such outcomes in wider settings. Beauty, functionality and comfort appear to be unattainable and unimaginable for the wider community.

As I pondered these issues and conducted a wide round of public consultation in my role as Victoria's environmental sustainability reporter I found myself exploring the work of Rob Roggema. Rob's discussion of charrettes as a participatory planning process interrogated the same litany of questions and the charrette methodology seemed to provide some practical ground-truthing and theoretical focal points.

I recall warming to Rob's enthusiasm for this inclusive and potentially liberating methodology. My work over time and terrain with Aboriginal people predisposed me to a belief in the highly effective role people can have in addressing their own concerns. Rob's work spoke to my own understandings – across continents, oceans, cultures.

In intensely practical ways I was delighted to be able to assist Rob in populating some of the charrettes he and the public conducted.

Physically, it was pleasing to see maps rolled out, smoothed, placed on tables: landscapes brought to people in fresh, real and evocative ways. My own views of people's unique understandings of the places in which they live were reinforced as I watched adults and youths, men and women, pouring over these maps.

I witnessed them re-drawing and designing historical places in their minds-eye, populating the roads and the surveyed sites with known icons, with histories of families, with contours and crop regimes, with livestock and disused stock routes, water tanks and school yards, with flood and drought stories. Their understandings of the physicality of sites, of the needs of the places they cared about, and the needs of the communities who lived in these places were historical, cultural and contemporary and they were given voice.

In particular I am pleased to see Rob has written about the Sea Lake charrette.

Sea Lake is a small town (population no more than a couple of hundred people at the most) in the Mallee region of Victoria. It is a dry place which will become drier as we enter into climate change realities. It is ostensibly a lonely place on a thin strip of blue tarmac which is driven-through rather than lingered-in. It is an outlier town where the community cares passionately about the continuation of their place, about the return of their children from university in the metropolis, about the education of their primary school children in the town, about their centres, their stores, their cricket matches, women's associations, and book clubs. This little town is big in its will to survive the population and skills drain which we see taking place.

We attended the charrette and watched children fill pages of butcher's paper with ideas, proposals and issues which concerned them. We listened as they talked about their group response to the question of sustaining the town. Their commentary was intelligent, enthusiastic, inclusive, reflective and purposeful. They had views and proposals. They had an interest in planning for and about the places in which they lived.

Townspeople then talked of the procedural and governmental issues, of process and practicalities, of failed efforts and aspirations. Intriguingly the physical presence of the maps kept drawing people back to understandings of the landscape – out of the council chambers and the organisational obstructions. The draw of the land/map was 'true north', much as it always is (even if differently so) for Aboriginal people.

The Sea Lake charrette, conducted relatively quickly for us, over a couple of days, provided a unique insight into the manner in which people can be drawn away from the road blocks and out into the landscape, generating the skeletal framework for useful and potentially highly productive outcomes.

I witnessed a charrette process which is more than just useful. It can free up tongues, lighten loads, and shuffle and share responsibilities around. It can be conducive to simple, elegant, lived-in planning and organisational solutions. It can promote rupture with past ways of doing things and by this means open up new routes. No other planning process appears to promise this in quite the same highly localised and realistic way. When people are invited to explore meaning in this way that meaning comes from deeper reaches, is more carefully articulated and it promises both stability and flexibility, fundamental human needs in any planning process.

This collection holds a mirror up to us and our practices. It provides an intelligent counterpoise to the way we do things now and reminds us we can do better if we take the time and always return, quizzically, to places and the people who populate them.

Melbourne Katy Auty

Preface

When you study to become a designer you think, and you'll be taught that the design will change the world. It is very easy to mix this up with an idea that this design, once it's been designed well, is the end of the story, which from then on provides the desired change automatically. This occurs to be not true. Only in specific cases in history designs had immediate effects on the spatial city appearance. The work of Albert Speer was such a case, in many of the former Soviet states it happened and rebuilding after World War II it occurred in the Netherlands. The hand of the designer was not always very successful when we take a look at how these examples are currently valued. Off course, there are more positive examples, such as Haussmann's boulevards in Paris, the canals in Amsterdam or the Cerda grid in Barcelona, which at the time of realisation encountered protests, but these strong views on city development led eventually to a highly valued environment. These cities were lucky!

This book has been written to support community involvement in the design process in order to prevent negative outcomes from a top-down design approach. The combination of community involvement and design is, at least in literature, not very extensive. Despite there is much written about stakeholder involvement, this is often not directly related to design processes and, even more important not allowing community members to design their desired future themselves.

There is however a much practiced way to cater for this, underestimated, desire of 'ordinary' people to be part of the conception of the design: the design charrette. Though the design charrette is conducted in many different ways, they all allow for the participants to sit at the table and make visual what they want their future to be like. As it is often the case the local community feels they are not heard when the government, or a developer, or a combination of the two, share the power to decide what is best for the community. This is, and the examples in this book witness this, all around the world the same story. The people that are involved in design processes want to contribute to a better quality of the design, they are never aiming for a lower quality and there is no need for fear in involving them. They all have usable skills and are keen to show them in the design process.

The participants in design charrettes all express the fact of the adventure and the journey they have experienced throughout the length of the charrette. During this adventure every participant has their own story to tell. The impacts of these adventures are very robust. The experience and personal learning resulting from these design charrettes are stored at a deep level and stay forever with the participants. This is very interesting, as it illuminates the effectiveness of design charrette in personal development and learning, but also as a way to share desired future pathways. Especially when resilience, climate change adaptation and renewable energy are themes this impact is very important to share sustainable solutions and, often due to involvement of market parties in the design charrettes, increasing the chances to realise these designs. In several of the examples showed in the book the participants worked with plasticine. This bright coloured 'manipulatable' substance proved to be an excellent material to build in 3D the desired future, commonly shared amongst the people around the table. The working with plasticine has also another effect. It allows people to drop their fences. The basic work with coloured clay makes people forget a little about the vested interests of their home organisations and gives them the opportunity to engage with each other and discuss the truly best options for the future. And delivers beautiful results!

In the charrettes I have been part of and/or I have led a broad range of people was involved. From experts, citizens, professors and students, politicians, shop-owners and farmers to teachers, academics and consultants, a very different group of people gathered around the tables. A special occurrence was the design charrette in Sea Lake. In this case a concurrent charrette took place for primary school children. Mind you these kids are the inhabitants of their own plans, not the adults! It turned out to be a very special charrette, in which the children's ideas cross-fertilised with the designs in the adult groups. Designs were kept secret, proudly presented and stolen from each other! A large common denominator with incredible support was the results. The diversity of contributors also showed me that everyone is a designer. Everyone has ideas about how their future must look like and with the right tools everyone has the ability to express themselves in a very tactile way. The design charrette process, which lasts at least 2 days, cares for an atmosphere that allows people to open their minds and share their thoughts in visual ways.

Many design charrettes, conducted around the world are available to limited extents. Often there is a report about the results, but in most of the cases there is little information about how the charrette was executed. Therefore it is important to not reinvent the wheel every time community members are involved in designing their future, or build on the knowledge and experience of a handful charrette-experts or –consultants. This book brings together profound theories about how to conduct a design charrette and the theoretical background and shows a range of charrette examples from many different places, assignments and contexts. The practicalities of each of these examples and the deeper understanding of the functioning of and learning in a design charrettes offers a balanced and sound base to start creating your own. In the last chapter, Mr. Xu is sharing his story and all he had to deal with in organising his own charrette. This chapter can be read as a guidance to charrette leaders.

The first chapter sets the problem of not involving local communities in planning processes, before Chap. 2 outlines the characteristics of a design charrette. In Chap. 3 the type of learning that will occur during a charrette and the conditions to realise this learning are described. Chapter 4 then elaborates on the paradigm shift in several fields relating to design charrettes, such as spatial planning, stakeholder engagement, methods and others. This chapter finalises the theoretical part of the book. In Chap. 5 till 11 specific design charrette processes are described, both from a perspective how the charrette was executed (the process) as which results are delivered (the content). Examples from Jordan and China (INCREASE), the Netherlands (Grounds for Change and Groningen), India (Rajasthan), China (Chongqing, Shenzhen and Guiyang), Spain (Lugo) and Greece (Strofylia) and Australia (Bendigo and Sea Lake) are presented in the respective chapters. The book finalises with Chap. 12, in which a hypothetically design charrette is organised by Mr. Xu and all the lessons from the former examples are integrated in one charrette process, which can be used as a guideline for charrette organisers.

I hope this book will support and provide the content and information to everyone who wants to conduct a design charrette or is about to take part in one. I also hope that this book may lead to the start of a bit of theory-forming around the subject and that many people will be challenged in their thinking about the design process and how to involve local communities closely.

I'd like to thank all the authors that have contributed to the realisation of this book and especially to all charrette participants, without whom there wouldn't be a book about it.

Canterbury, VIC, Australia Rob Roggema
March 2013

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Chapter 1
That Stubborn Mr. Vedder

Rob Roggema

1.1 Introduction

There is a lot that can go wrong in a planning process. The design can be wrong, the construction lacks confidence, the functionality of the design doesn't meet future requirements and many other parts of a design may proof not adequate. In some cases this leads to opposing opinions and resistance. Realisation of the design delays and construction times are extended. Sometimes the design needs to be adjusted because there is no adequate solution for a risen problem. In many cases the people, which the design concerns, are not a part of the process, are not talked to or with or are only 'consulted' at the end. Often these people are seen as an annoying and necessary evil to be dealt with at the end of the planning process. Especially when these people become obstructive it causes frustration with the initiators of a certain plan. However, there are ways to overcome these and involve and communicate with the people that are concerned with the effects of planning initiatives. In this introductory chapter some bad and good examples illustrate the necessity to shape the design process in a way in which people can participate and contribute to the process.

1.2 Victoria Hotel, Amsterdam

For everyone leaving the Central Station in Amsterdam the first view of the city is a bit strange. At least for the ones that have an eye for detail. The huge Victoria hotel across the street is not a building as you'd expect. There are two little buildings

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Fig. 1.1 The two small buildings, encapsulated by the Victoria hotel, Amsterdam (Photos: © Rob Roggema)

encapsulated by the bigger hotel (Fig. 1.1). These two small buildings do not fit the overall design.

At the time, in 1888, a proposal to build the Victoria hotel at the corner of Damrak and Prins Hendrikkade was launched, despite the fact that several houses stood in the way. The owner of the NV Hotelonderneming Victoria Hotel planned, based on the proposed plan of the architect, to buy five houses at Damrak and five houses at Prins Hendrikkade. Everyone sold, except two of the owners as they saw unprecedented opportunities to increase the price of their houses. These two houses, standing next to each other at the Prins Hendrikkade, then became part of a negotiation game between Mr. Vedder, representing both owners and the representative of the NV Hotelonderneming, Mr. Ebert. This process, beautifully written in the novel 'Publieke Werken' (Rosenboom 2000), started with a beautiful mistake by Mr. Ebert when approaching Mr. Vedder for the first time, offering him a 20,000 Gulden[1] buy-out, but putting him under time pressure at the same time, while the preparations by the NV Hotelonderneming already carried on for several years: "What requires time, will receive time", Mr. Ebert said, "but you need to understand that I couldn't visit you any earlier. First, we needed to be certain about the factual continuation of the building and far from doing nothing the directors have been busy solving all kinds of problems, financial problems, technical problems……" (Rosenboom 2000, page 88).

[1] Gulden is the former Dutch currency, replaced by the Euro in 2000.

This implies that the company, intending to build the hotel, prepared for everything, except for starting communications with the current owners. A little bit further, Vedder states: “By the way, do you know what really starts annoying me? You didn’t even ask us whether we want to sell the house in the first place! You don’t seem to understand that your entire hotel plan depends on our cooperation, without which it can be thrown in the bin completely…..” (Rosenboom 2000, page 155). And in reply on the 20,000 Gulden offer he replies: 50. The process continues and demolishment of surrounding buildings and building the new structures starts to take place around Vedders home, but he refuses to accept a lower price than 50,000 Gulden. In the end, Ebert visits Vedder for the last time, asking him if he still holds on to his price.

> Vedder asks[2]: “Why on Earth are you here? Do you want to negotiate?”
> “Eibert: You?”
> “Always… you know my price!”
> “Do you hold on to it?”
> “I can’t do anything else.”
> “In that case we need to consider our discussions as ended. We will build around you.”

And this is what happened. The two little houses are still remaining at the same spot and the big Victoria hotel has managed to build its way around them. This historic Dutch example seems to find imitation in recent developments in China.

1.3 Nail Buildings

The story of the Victoria hotel is not a single occurrence never repeated in the world. New Mr. Vedders stand up and negotiate their possessions. In rapid changing China for instance transforms the rural, agricultural, landscape in high-rise urban neighbourhoods. Farmers, who took the opportunity and reshaped their farms into mid-rise entrepreneur buildings, were soon after removed by the urban machinery as beautifully described in “the city that moved to Mr. Sun” (Hulshof and Roggeveen 2012). Some Chinese citizens persisted in occupying their homes, even after the building process had started. These buildings, somewhat awkward standing in empty building pits, have their own name: nail buildings.

In Chongqing for example, Ms Wu Ping refused to leave her house to make place for new real estate developments (Goldkorn 2007). She says: “Among the residents moving, I am the largest private property owner, furthermore you can basically say I am the only one who has complete papers, such as a property rights land right certificates, they both clearly indicated that it is a building zoned for business. At that time I had just finished renovations, and they (the developer) said they had to tear everything down and people had to be relocated, as a result this was really damaging for us. According to my property right certificate, I am clearly in ownership of 219 square meters, so for this use it should be returned to me” (http://venture160.wordpress.com/2007/03/22/interview-with-chinas-most-incredible-holdout/).

[2] Cited from (own translation): Thomas Rosenboom, Publieke Werken, page 461–462.

Fig. 1.2 The ‘nail-house’ in Chongqing, China (http://www.danwei.org/bbs/property_rights_the_coolest_na.php and http://washingtonbureau.typepad.com/photos/uncategorized/2007/03/24/chongqing1_2.jpg)

Fig. 1.3 Development site in Shenzhen with Mr. Choi’s six storey building in the middle (http://simonworld.mu.nu/archives/222621.php and http://farm4.staticflickr.com/3238/2677366931_0d076355c9.jpg)

According the Welian Real Estate Sales Company, she asks 20 million yuan, or she’ll ‘stay till the end of the world’.

The Chinese invented a word for this: *Dingzihu* that means a household or person who refuses to vacate their home to make way for real estate development. Virtual China translates the word as ‘nail house’ because “they stick out like nails in an otherwise modernized environment”. Developers turned her house into an island standing alone in a 30 ft deep man-made pit (Fig. 1.2).

A similar example from Shenzhen shows Choi Chu-Cheung’s six-floor villa in the booming central business district standing isolated in the middle of a huge construction site (Fig. 1.3). Mr. Choi will stay until he gets more compensation despite an order by the Shenzhen land resources and housing management bureau last month ordering his family to move out. The arguments and history of Mr. Choi resembles the one of Mr. Vedder in Amsterdam more than a century before:

> Mr Choi and his wife have repeatedly rejected a cash compensation offer from the developers, who want to turn the Caiwuwei site into an 88-storey financial centre. The other 389 households accepted the developers’ compensation and moved out earlier this year.

Fig. 1.4 http://www.dailymail.co.uk/news/article-2236746/Road-built-building-couple-refuse-China.html (Ward 2012)

> The couple demanded the developers to offer them a new block of land of similar size near the financial centre or increase their offer from 5.06 million yuan to 14 million yuan. An administrator from the Caiwuwei redevelopment office said the demands were unreasonable. (http://simonworld.mu.nu/archives/222621.php)

Not only the development of real estate causes nail houses, the building of a motorway can lead to weird images as well (Fig. 1.4). In Weiling, Zhejiang province, an elderly couple refuses to move as a road is built around their apartment. Luo Baogen and his wife insist on living in the half-demolished building because they believe that the relocation compensation offered by the government is not enough. To ensure the couple's safety, adjacent rooms in the building have been left intact but all their neighbours have moved out. Again, this story contains the same elements as were part of Mr. Vedders story: all the others, who accepted the compensation have left, the offer from developer or government is not enough and we, the owners, stay.

The underlying cause in all of these cases is probably not only the as too low experienced compensation, but has got everything to do with on-time communication and involving people in planning.

1.4 Amelisweerd, Utrecht

A good example of top-down planning is the building of the motorway A27 in the Netherlands. The central government decided to project this road through the rural estate of Amelisweerd, a forest area of significant ecological value. Not so much the exact ecological quality as well as the symbolic value of the road cutting through the forest led to years of protests and demonstrations. Ultimately Parliament had to decide and chose with a very small margin in favour of the construction of the road. This decision ignited the occupation of the area with tents and treehouses, a tactic very similar to the Occupy movements, which have spread around the world in 2012. This camp was demolished in 1982 by the police and 465 trees were immediately chopped (Fig. 1.5), making a trial in court, aiming to withheld cutting down

Fig. 1.5 Symbolic graffiti, remembering the chopped trees of Amelisweerd (http://nl.wikipedia.org/wiki/Amelisweerd)

the trees, superfluous. In 1986 a slightly changed route and a much smaller road was constructed. The entire process lasted for years, reasonable communication was absent and the costs for the initiator, in this case the government, became much higher than a smooth planning process would have cost.

1.5 Planning Without a Condom

The examples of nail houses, roads through forests and villages and hotels built around tiny houses are not only a result of greedy developers and investors who want to make a profit, but they are also the result of planning processes and habits. Planners are used to make a plan first and only when they are satisfied share it with people directly affected by the plan and the wider public. In this model the planner is seen as the person who knows all. The black box of his mind determines the best outcomes. Once this process is completed the plan comes out in the form of strict ideas and regulations how the future needs to be. Any risk is avoided, because this could change the plan. The result is a one-and-only plan, result of mono-rationality, which does not do justice to the real world in which poly-rationality, dissimilar uses and cacophonous diversity are a reality (Davy 2008). Spatial processes do not run straightforward or show regular patterns, but they consist of periods of stability and routines, interrupted by sudden major changes. These irregularities require Planning by Surprise (Timmermans et al. 2012). In order to connect better with this reality, Davy (2008) pledges to plan it without a condom, implying that planners need to move away from restrictive and protective planning practices. The role of the planner then shifts from the almighty person determining the future towards someone who listens to the broad spectrum of demands and desires and collaboratively develops a plan. In the latter model there is a crucial role to be played by the people living in the proposed planning area. They become co-designers of their own future and are challenged to contribute a wide range of ideas to the planning process and the resulting plan. Preventing all nail-houses from appearing in building sites is probably not possible by adjusting the planning attitude, but engaging stakeholders from the beginning in the process would most certainly increase the chances for smooth and integrated planning.

1.6 Engagement

There are many ways to involve stakeholders in a planning process. Apart from design charrettes, the subject of this book, which will be discussed extensively in the rest of the book, several examples show different levels and ways of involvement.

In Amsterdam for instance a new urban district is developed in the IJ-lake. The majority of this development takes place on artificially made islands in the lake, while another part consists of floating houses. Within this area there is space to develop your own house. The only requirement is to secure your house to the provided pier and to make sure the house actually floats. The architecture, expression, size and number of storeys are under supervision of a municipal urban designer, but merely free to ones own taste (Projectgroep IJburg 2000). The result is a wide variety of houses, grouped along the piers, of different size and architecture (Fig. 1.6).

Other examples of 'building your own home' without restrictive planning regulations are for instance found in Almere, where subsequent competitions led to

Fig. 1.6 Self build floating houses in Amsterdam IJburg (Photo: © Rob Roggema)

Fig. 1.7 Some of the 'Unusual Living' houses in De Fantasie: *Hard Glas* (*left two images*), and *Blue House* (*right*)

Fig. 1.8 Examples of the 'Temporary Living' competition: Polderblik, Hoog en Droog and Campus

extraordinary homes in De Fantasie and De Realiteit. Both are seen as early precursors (Stassen 2001) of Wild Living (or: het Wilde Wonen (Weeber 1998)) and Wild Urban Design (Wilde Stedenbouw), which later on gained considerable support.

De Fantasie, "The Fantasy", (Fig. 1.7) is the result of the design competition in 1982 called Unusual Living, which originally was intended as a short-term exhibition. The houses were meant to be easy dismantable and were seen as very controversial in the beginning, but over time people in Almere started to like them so much that they'd stick around.

De Realiteit, "The Reality", (Fig. 1.8) is a similar, second competition, dated 1985, for which the theme 'Temporary Living' was chosen. These houses, which were meant to be dismantled after 5 years, do still exist.

In 2009 a third follow up competition was launched and the houses of De Eenvoud, "The Simplicity", have been built (Fig. 1.9). These houses needed to be simple and cheap in times of economic difficulties and show a strong relationship with their surroundings. The Rubber House is preassembled and constructed completely from second hand materials and in Ornithologists house, bird and man co-habit the building.

Another way of involving people in developing plans for the long-term future is found in the province of Friesland, the Netherlands. In the project Fryske Fiersichten (Provinsje Fryslân 2007) everyone was asked to submit project ideas that could

Fig. 1.9 Korf and rubber house (background) and Ornithologists house in De Eenvoud, Almere

support the Province of Friesland in achieving a sustainable future. A selection of the most interesting ideas was subsequently invited in the Queens Commissioners house to present and discuss the projects. A richness of future thinking could be harvested and, even more important, the commitment of the ones that submitted them illustrated that it is possible to have a debate about the long-term future.

Interaction and involvement of project partners in the F:ACTS! Project (http://www.factsproject.eu/) has been arranged in many different ways (García et al. 2012). Project partners visited each other and operated as coaches for each other, cross-project workshops were held and the participation of students was integrated in real world planning processes. The fact that students were given the chance to contribute as real and full experts during the final conference is exemplary and the present they received in the form of a crate of Belgium beer (Fig. 1.10) was as symbolic as deserved.

1.7 Conditions for Engaged Planning

Out of the last couple of examples several general values to incorporate in spatial planning processes can be derived. When planning processes are meant to be inclusive, e.g. involving anyone who wants to be part of the process and anyone who is due to the place where he/she lives an involuntary part of the process, the following conditions are rewarding both in the reached quality of solutions, the pace of developments and the costs:

- Early involvement: Even before certain ideas for developing a specific area are crystallised, initiators should involve stakeholders and start communication about eventual change in an open way;
- Serious and genuine attitude: The initiators of a development should take the stakeholders seriously and make sure that this is genuine. Any sense of a fake attitude or hidden agendas is sensed by the stakeholders and will deteriorate the process;

Fig. 1.10 A thank you for participating students: a crate of Belgium beer (Photo: © Rob Roggema)

- Prepare to change mind: When starting a planning process there are always certain, even unconscious, ideas that form the reason behind wanting to develop an area in the first place. Open mindedness and preparedness to change plans and ideas at any given moment in the planning process, even if the finish is near, is essential to reach the best outcome;
- Bring in the extraordinary: without bringing in people with different views or even unwanted ideas there is a large risk of copying ideas and plans from history. Specifically when representatives with a large history in the development of the area are part of the process the result to end up with the same old ideas can be easily reached. Instead, new, extraordinary people, the away-from-the-average-thinkers add value to the process and the quality of the, to be developed, plan. As described in "Karaoke Kaptalism" this mix of new ideas with the existing is a core success factor for (economic) prosperity (Ridderstråle and Nordström 2004).

- Bring together a large group: When many people participate in the process the chance is bigger that diversity is large. This fact only causes a higher likeliness at creativity (Florida 2005). And when planning processes are undertaken, creativity helps to find solutions that satisfy stakeholders and all participating in the process.

These conditions do not stand-alone. There may be more, but in any case they need to be used in a challenging, inventive process, which does justice to the involved people, the identified problems and the imposed challenges.

1.8 Design Charrette

The design charrette is a specific form of engaging people in a planning process. It is a creative, intensive and an embracing way to discuss, draw and build images of a future that is desired by *all* participants. Drawing from many experiences there is a kind of magic, an untouchable piece, in operation during a design charrette. This causes a sensible way of committing people, who all transform in designers of their own future. This book aims to shine light on this process, giving theoretical background, a general framework and many practical examples how successful design charrettes can be conducted.

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Part I
General Theory

Chapter 2
The Design Charrette

Rob Roggema

[shuh-ret]

A gathering of people for an intense period of brainstorming and design. Faced with a problem or challenge the participants pool their talents to produce plans to achieve a goal

2.1 Introduction

The term 'charrette' is originally from France. At the end of the nineteenth century the Architectural Faculty of the *Ecole des Beaux-Arts* issued problems that were so difficult few students could successfully complete them in the time allowed. As the deadline approached, a pushcart (or charrette in French) was wheeled past students' work-spaces (Fig. 2.1) in order to collect their final drawings for jury critiques while students frantically put finishing touches on their work. To miss 'the charrette' meant an automatic grade of zero.

In this chapter the design charrette is defined and the key characteristics and benefits are elaborated. Further, the diversity of design charrettes is explored and the key dimensions of charrettes are defined. Finally, a proposal for framing design charrettes is launched.

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Fig. 2.1 The charrette in action, collecting architectural work at the School of the Arts in France in the nineteenth century

2.2 Characteristics of Design Charrettes

Charrettes are successfully used in the most controversial and complicated design and planning problems. Examples of these, as given by the NCI (National Charrette Institute) include (Lennertz and Lutzenhiser 2006):

1. High stakes projects involving substantial public and private investment;
2. Volatile yet workable political environments – situations that are 'hot' but manageable;
3. Complex design problems;
4. Real projects that include imminent development.

The NCI defines the charrette as: "a collaborative design and planning workshop that occurs over four to seven consecutive days, is held on-site and includes all affected stakeholders at critical decision-making points" (Lennertz and Lutzenhiser 2006). Elaborating on this, Condon formulates it in slightly more abstract terms as: "a time-limited, multiparty design event organised to generate a collaborative produced plan for a sustainable community" (2008).

In order to develop a successful design charrette several aspects are important.

2.2.1 Knowledge Creation

Generation of new tacit knowledge, opposite to explicit knowledge (transmittable in formal, systematic language), has a personal quality, which makes it hard to formalise and communicate. Tacit knowledge is deeply rooted in action, commitment, and involvement in a specific context (Polanyi 1966, cited in Nonaka 1994). This type of knowledge creation, which is useful in dealing with far from logic, formal and systemic phenomena such as climate change, can be encouraged through

1. Construction of the field: building self-organising team,
2. Sharing experience,
3. Conceptualise,
4. Crystallise in the form of product (facilitated by encouraging experimentation) and
5. Justification.

In the process, in order to create new knowledge successfully a certain level of creative chaos and redundancy of information is required, making it possible to provide new information. A good example of both involvement and new knowledge creation has been carried out in the city of Tromsø, Norway, where the design is seen as a (creative) experimentation, involving people and defining planning as an inclusive process, whilst breaking with institutionalised practices (Nyseth et al. 2010).

2.2.2 The Thin Slice

Organising and taking part in design charrettes is not about comprehensive understanding after which well-considered choices can be made. In a design charrette the search for the 'thin slice' (Gladwell 2005) is actively pursued. The thin slice is the little piece of, unconscious, knowledge about the right decision or opinion about something. In a split second one knows what's right. During a design charrette well-informed people are also in search of these unconscious intuition about their desired futures. When found, these can, are and will be discussed. Ways to find these thin slices are drawing and, more so even, building 3D-models. In these activities the unconscious is appealed to, bringing split second knowledge, values and feelings to the fore.

2.2.3 Creativity

It seems obvious, to be creative in design charrettes, but it isn't. Creativity is optimistic and positive, and delivers the most interesting important, human elements (Csikszentmihalyi 1996). It is really fun to pitch up something really new (astronomer Vera Rubin in: Csikszentmihalyi 1996). The system of creativity consists of three elements: area (where a set of symbolic values rule), field (the people that guard these rules) and the individual, who adds a new idea or insight, which changes the existing area, i.e. the existing set of values. Creativity is then defined as 'every action or idea, which changes an existing area and transforms in a new area'. In developing new ideas the process of creativity is always temporarily 'underground', invisible as a secret time. This conceiving period takes place in 'obscure corners' of the mind, outside rationality. One of the times this process happens best is during sleep, or overnight. This might explain why resolutions often happen the 'next morning'. Finally, the right environment needs to be created to support creativity. Places where information is available, intensive exchanges take place or resources to support new ideas are provided, are the most likely to spark creativity. A beautiful surrounding might also help.

2.2.4 Governance

A traditional 'top-down' policy approach, in which the State directs, manages and takes care of all citizens is, given the wicked character of climate change and the urge for enhancing adaptive capacity in society, suboptimal or even contraproductive. The roles of and relations between State and its citizens, more often organised in strong network relationships within and outside specific societal groups, needs to be redefined. Adaptive capacity can be enhanced if flows of resources and information between individual elements in the network as well as outside these networks can flow freely and a mutual relation between State and society is established (Adger 2003).

2.2.5 Transformation

It seems evident that with sudden and unexpected changes in global and regional climates, urban regions and landscapes need to undergo a transformation in order to be able to deal with those surprising circumstances. Such transformations are not new. Larger cities, in preparation for mega-events did transform, using marketing tools and urban planning and design as instruments to shape an image of the region after transformation. Good examples are Glasgow in its preparation to become Europe's Cultural Capital (García 2005) and Barcelona, preparing for the '92 Olympics (www.mt.unisi.ch). Several basic drivers are identified to be able to enforce transformations of urban regions. Urban transformations find their origin in (1) pressure from the outside landscape (the general context), (2) dissatisfaction with the current, stable regime, and (3) start as novelties and niche developments, which ultimately lead to breakthroughs in the existing regime (Geels 2002, 2005, 2011).

2.2.6 Let It Flow

When participants in a design charrette are caught by the subject and committed to the assignments the most disturbing thing to do is to jump to the next step in the 'fixed' program because the program has been designed that way and tells 'us' to move on. When the program starts to dictate what needs to be done instead of the drive of participants the charrette is on the wrong track. Instead, once people are in a flow, working concentrated and focused on designing and building their future, let it flow and do not intervene. The only times interventions are necessary, are when people are confused or explicitly on a dead end;

2.3 Four Basic Rules

Nine general rules for a good charrette process are defined (Condon 2008). The four acknowledged as the most significant are:

1. **Design with everyone**. Despite the fact that becoming a designer requires thorough training and very specific skills, the design process as undertaken during charrettes is integrative and contains a variety of possible solutions. This is partly an intuitive and judging activity, which makes it accessible for many individuals. In this sense, everyone is a designer;
2. **Start with a blank sheet**. Standing around the table, on which a large map of the site is laid down, the simple action to overlay this map with a blank piece of transparent paper invites participants to contribute. The challenge is there literally laying in front all. Everyone is invited to fill in the future and a shared vision will, in the hours to follow, fill up the formerly empty paper;
3. **Provide just enough information**. Too much information causes decision paralysis and too little produces bad proposals. Just enough is mainly arranged through the expertise of the participants and will be provided during the charrette in a concise and easy to grasp way (e.g. maps and schemes);
4. **The drawing is a contract**. All drawings produced during the charrette embody the consensus as experienced and achieved by the charrette team. They form a well-understood agreement, or contract, in images amongst the group. The drawings cannot be broken without consent of the group and function as such as a very strong commitment.

2.4 Definition

The design charrette is defined as: "Two or more day intensive design workshops in which a mixed group of participants work collaboratively towards designing future visions for a certain area." A design charrette:

1. Integrates intuitive, rational and emotional knowledge;
2. Is an inventive approach, includes idea-generating forces and results in envisioning futures;
3. Is set up in a creative atmosphere to allow many different stakeholders to collaborate;
4. Alternates between plenary discussions and small mixed design teams to provide a creative environment to think about the future in unlimited ways;

5. Creates an environment in which out-dated frameworks, often related to individual beliefs or 'silood' policies, can be overcome;
6. Makes use of maps and other visual tools to allow people to collaborate and integrate topographical, ecological as well as social and economic aspects.

2.5 Benefits

The way design charrettes are organised help to create an atmosphere that differs from regular and day-to-day working environments. This environment is created because it allows people to enter a different mind-set and use a broad variety of ideas, values and habits. The charrette process offers participants the following:

- Participate in a creative way to think about the future;
- Use technical data in a creative way in order to develop ideas about responses;
- Develop design ideas, which are based on the uncertainty and unpredictability;
- Speculate about future change and ways of living:
- Open minds and conversations, which d o not necessarily take place within settled structures and habits in government or elsewhere;
- Work in a "bottom-up" way and take local knowledge and perceptions into account in designing and decision making;
- Collaborate across disciplines, organisations and levels of government;
- Share responsibilities.

2.6 The Role of the Designer

In the majority of planning and design project the designer, whether it is an architect, urban designer or landscape architect, is the primary person responsible for the content of design proposals. This central role, in which the designers is often seen as 'the planner who knows it all' (Davy 2008) has a pitfall in becoming immune for excellent ideas from others. This results in potentially averse reactions from the public depicting the designer as being will-full, crotchety or cocky. Even if the opposite is true, and the designer is an open-minded and gentle person, the perception works against profitable, sustainable design solutions. Especially when the designer comes in contact with the public, moving away from the centric role is beneficial to the design process, as it gives others the space to come with design proposals. Hence the designer swaps from a prima donna role to a more serving and/or facilitating role. In a design charrette, which is all about sharing and joint collaboration, the designer should be humble, for instance taking up a role as observer and collector of the desires of the community. After capturing the results of the charrette the designer can use design skills to transform these into designed drawings, which play a role in any follow up meetings or reporting.

2.7 A Wide Variety

Most of the planning and design processes take place within regulated frameworks and procedures. Despite this fact, around the World many design charrettes have been conducted. They all differ in subject, scope, assignment, location, length, participants and more (Roggema et al. 2011). Amongst the best practices are:

- *Grounds for Change Charrette North Netherlands* (Van Dam and Noorman 2005). This charrette was part of the IGU-Bridging to the Future project, which facilitated by the International Gas Union, brought together design teams from China, India, Canada and the Netherlands in exchanging and cross-link to design a regional spatial plan for a future sustainable energy system. In the Dutch charrette, taking place in Groningen, a wide range of participants, such as energy experts, designers and students took part in this 7-day event. See Chap. 9 for an elaborate description of all Grounds for Change charrettes;
- *The Jinze charrette* (Roggema and Van den Dobbelsteen 2006). This weeklong charrette, being part of the same IGU-Bridging to the Future project, took place in China. International experts, from Germany, Canada and the Netherlands, in the field of energy and design, participated to develop a spatial regional plan for a sustainable energy supply. Mingled and partially parallel with the main process, Chinese students operated in their 'own' charrette, proposing spatial design for a renewable future for the area;
- *Grounds for Change Drenthe Design Teams.* During a 4-day conference on renewable energy and spatial impacts, four assigned teams (Van den Berg 2010; Sikkema and Lucius 2010; Grontmij 2010; Polman 2010) were asked to design a sustainable energy future for the Dutch province of Drenthe. The design needed to develop design solutions focusing on the implementation of a sustainable energy supply for the next 30 years. The designs were made in the interdisciplinary teams, consisting of experts from consultants in combination with governmental representatives and external experts. The designs were presented during the closing session of the conference;
- *SketchShips* ('Schetsschuit', in Dutch) are intensive tow to 3 day design workshops originally held on a ship. Several examples, which took place in Texel (Waddenvereniging 2010), South-West Ameland (Waddenvereniging 2009), Haarzuilens (DLG 2005) and Eindhoven-Helmond (DLG 2009) illustrated the conceiving power of interdisciplinary teams in designing a future, which dealt with the effect of climate change and/or the sustainability of the landscape. For practical reasons these SketchShips were moved to the mainland;
- In Flagstaff (Arizona) the subject of the charrette was the *urban design for a transect*. The focus lied on the enhancement of urban structures, amenities, urban living and a sustainable zoning of functions across the city centre (Opticon Design and Lisa Wise 2009). Besides the consultant team, executing the charrette, the public was involved at certain stages of the process;

- *Grounds for Change charrettes Drenthe.* In succession of the Grounds for Change charrette in 2005 (Groningen) several charrettes took place in individual municipalities in the province of Drenthe: Emmen (lab R+E+M 2008), Borger-Odoorn (Provincie Drenthe 2006a, b) and Vries (Provincie Drenthe 2008). The aim of these, 2-day, charrettes was to design together with local stakeholders, energy experts and designers a sustainable energy system for the mid-term future;
- The charrettes for the Squamish *Urban Waterfront* development (University of British Columbia 2004) consisted of two-by-two days, involved a wide range of participants, such as business representatives and citizens and aimed to design an integrated urban (re)development of the waterfront;
- *Hotspot Climate Proof Groningen* (Roggema 2009a, b). Ten design charrettes of 1 day were organised. These charrettes were isolated in time from teach other, but mutually connected through personnel unities and project management. The scope of the project was to develop spatial strategies, which would anticipate long-term changes in climate. The combination of scientists and policymakers participating in the design charrettes was a distinguishing factor. See Chap. 8;
- The planning process of *Vancouver North* aimed to design a precinct, which would be able to reduce GHG emissions with 80 % by 2050 and become a zero net emitter by 2107 (Condon et al. 2009). A wide range of participants, including the public, took part in the charrettes.
- The design charrettes *INCREASE I and INCREASE II* (Roggema et al. 2008; Roggema 2009a, b; Roggema and Boneschansker 2010), organised in Jordan and China respectively, lasted for a week each and focused on the design of a region which could function without the use of fossil resources in 2050. The pre-selected international participants, from Canada, Russia, Jordan, Germany and the Netherlands, are high-level experts in the fields of innovation, energy, design and governance. See Chap. 5;
- In Scotland, the Scottish Sustainable Communities Initiative organised three design charrettes, which were held in *Dumfries, Fife and Aberdeen* (Scottish Sustainable Communities Initiative 2010). The three sites, despite the fact that they ranged from an urban infill, a whole town development and a greenfield location, were approached through the future design of new places for new dwellings. Specialized international project coordinators in tandem with local experts participated in these design charrettes, in which the public was involved at specific moments.
- In the design charrette for *Belmore Park*, Norwich the focus lied on designing an integrated growth plan according the principles of New Urbanism (Broadland Land Group 2010). This charrette is shaped as an open invitation to the public to participate and collaborate with the design team.

Several of the design processes in which P3DM is practiced (see Chap. 4) can be classified as design charrettes as well, but these are not named the same.

In Table 2.1 these charrettes are comprehensively summarised analysed.

Table 2.1 Overview of the Characteristics of Design Charrettes (Roggema et al. 2011)

Charrette (country)	Subject	Time-horizon	Length	Participants	Public
Bridging to the future (China)	Energy	30 years	5	Experts, designers, students	No
Belmore Park, Norwich (UK)	New urbanism, growth	Not defined	8	Designers, consultants, council	Yes
Drenthe Design Teams (Netherlands)	Energy, climate adaptation	30 years	3	Experts, consultants, designers	No
Flagstaff (US)	Amenities, planning functions	Not defined	4	Consultant team	Yes
Groningen Climate Proof (Netherlands)	Climate adaptation	50–100 year	10 × 1	Scientists, designers, policymakers, local stakeholders	No
Grounds for Change Drenthe (Netherlands)	Energy	30 years	2	Industry, designers, consultants	No
Grounds for Change North Netherlands	Energy	30 years	7	Designers, energy specialists, students	No
INCREASE I, II (Jordan, China)	Energy	50 years	5	Experts, designers, scientists	No
Scotland	Integrated sustainable neighborhoods, reducing carbon footprint	Not defined	6	Designers, consultants, council	Yes
SketchShips (Netherlands)	Water management, ecology, coastal defense, archeology and heritage	Not defined	2	Experts, designers	No
Squamish (Canada)	Urban waterfront, integrated urban development	Not defined	2 × 2	Designers, business, council, citizens, students	Yes
Vancouver North (Canada)	GHG-emissions, integrated sustainability, urban design	100 years	Not known	Designers, policy makers	No

It is clear that design charrettes appear in many different shapes and semblances. Depending on the specific context there are many different ways to execute a design charrette. Differences may lie in the length (ranging from 2 days to an entire week), the range of participants (specialists and designers only, or all stakeholders and citizens involved) or the type of objective (a specific one, e.g. energy, sustainability or an integrated one, which aims for comprehensive urban designs).

Furthermore, design charrettes are successful tools in a range of (urban and regional) design processes in the developed world (The Netherlands, Canada, UK), but are also successfully applied in developing countries, as the P3DM projects in Chap. 4 resemble. Further, the INCREASE charrettes are hybrid. Held in China and Jordan (a BRIC country and a developing country) the subject can be classified as predominantly Western. However, involvement of local scientists, experts and civil representatives safeguarded the local impact and exchange and joint development of new knowledge.

Design problems in urban context seem to be more complex (interfering subjects, diversity of stakeholders, financial arrangements and so on), but rural issues can be complex as well. As the charrette processes in India (Chap. 7) and the P3DM-projects (Chap. 4) show, rural communities can benefit of the charrette approach in developing their future visions for their community or single building.

2.8 Contours of a Charrette Framework

As we have seen in this chapter the purpose of a design charrette may be possible to define in a more general way, at the same time the variety of problems tackled, stakeholder configurations experienced and time and resource constraints determining the form, requires openness in regards to the design of a charrette. In order to position the context for every design charrette five dimensions have been distinguished: the type of participants, the location of the project (urban-rural), its complexity, the development of the country in which the project is located and the scale at which the project is defined. Each of these dimensions are defined by a range of properties, which in combination with each other lead to a very specific context for a design charrette to be conducted.

2.8.1 Participants

The type (and number) of participants is determined by the ambition and objective of the project. A single building project requires other involvement than the debate about an entire metropolis or region. Also, when specific interests (land-ownership, financial or juridical powers) are in play, and the design charrette is not a 'free' exercise, the team of participants may be adjusted to the needs. Eight categories of participants are distinguished (Fig. 2.2).

1. Science: Academics that have a field of expertise related to the core problem that has been identified for the project at stake. In the case of climate change adaptation, climate scientists are very welcome to share their knowledge as a base for design solutions;
2. Designers: Architects, Urban designers, Landscape Architects, but also artists or other creative professionals (marketing, advertisement) are part of this group,

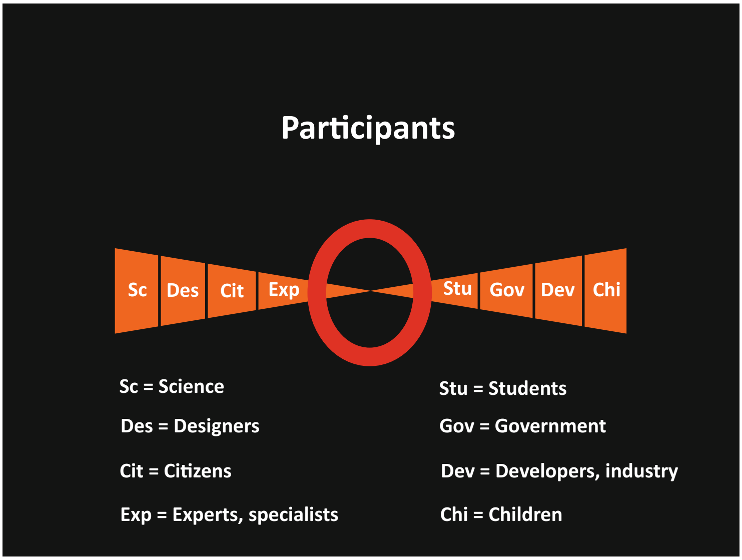

Fig. 2.2 The range of participants

which can be seen as the people that are capable of drawing, conceptualise ideas and work on visual representation;

3. Citizens: the people that live in an area or are the potential new inhabitants of a landscape, neighbourhood or a building.
4. Experts: People with knowledge of the specific area. These can be people that know everything about the history, cultural heritage, but also people that are experts in biodiversity, ecology and nature or any other knowledge that is specific for the area;
5. Students: Younger people that are studying a relevant subject, such as for instance students urban design (Jinze, Chap. 9) or Landscape Architecture (SeaLake and Bendigo, Chap. 6);
6. Government: The relevant governmental agencies, which are responsible for planning processes in the area. The local council/municipality is an obvious institution, but governments at State level are responsible for guidelines and overall planning regulations. Hence logical to involve.
7. Developers, industry: In many cases a design charrette is been organised when a certain development is proposed or in progress. Often, industry partners, such as developers, builders, are initiators of these developments and therefore relevant participants;
8. Children: Design charrettes aim to develop visions for the long-term, a period that often lies beyond the period that the participants of the charrette are usually no longer around. Therefore, the people that will inhibit this future, children, are very relevant to involve, however often neglected.

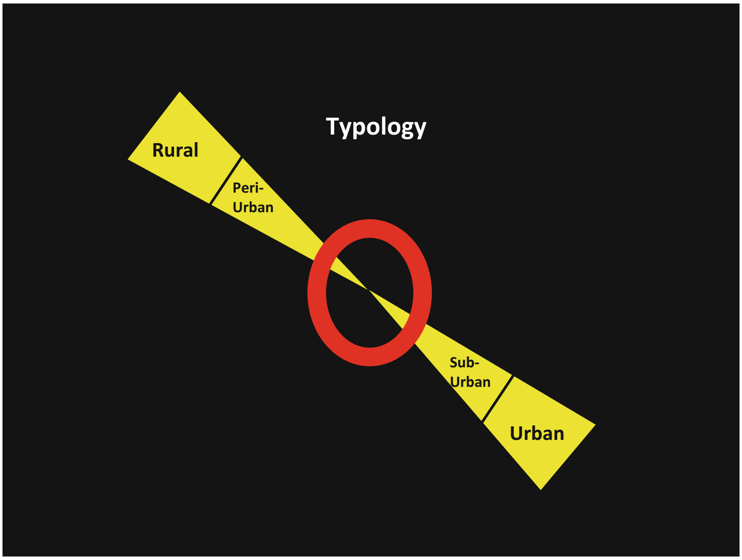

Fig. 2.3 The range of locations

2.8.2 Urban-Rural Typology

Projects can be located in different surroundings and the context determines part of the potential future visions. To propose a large nature reserve, prohibited to enter, in Melbourne's CBD might be the wrong content for the context. Four zones are distinguished (Fig. 2.3).

- Rural: the landscape outside the city and without major urban influences.
- Peri-Urban: the edge of the city where rural functions in the landscape meet urban developments and residential areas.
- Sub-Urban: main residential areas in lower densities with local amenities, such as schools, shops.
- Urban: The inner city in which offices, residential, shopping and central transport links are mixed.

2.8.3 Complexity

Systems in general are subdivided in four categories (Wolfram 2002): (I) closed system, (II) linear feed back systems, (III) systems randomly open to assimilation and (IV) non-linear adaptive systems (Fig. 2.4). Class IV systems are able to behave in a way they maximise benefits of stability while retaining a capacity to change (Mitchell Waldrop 1992).

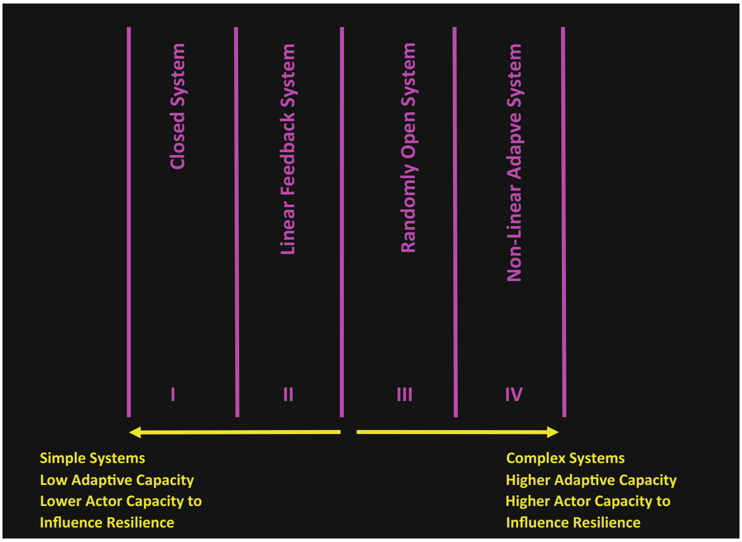

Fig. 2.4 Typology of complex systems (Based on: Wolfram 2002)

Projects can be defined on the same range, from simple to complex projects. Simple projects are projects for which the problem is clear and the solution can be formulated in a concrete way. In a linear feedback system the responses to certain inputs can be predicted by studying a small amount of identical inputs. In a randomly open system external influences are mitigated and 'buried' or laid to rest. After the disturbance the system will regain its performance. The behaviour of a non-linear adaptive system cannot be predicted as the system adapts and changes to a new system, which can lose functionality or transform to a higher level of complexity (Fig. 2.5).

2.8.4 *Development*

The country in which the project is located will determine for instance the culture, type of problem, available resources and awareness of problem. Countries are classified in many different ways. For this purpose the countries are roughly categorised in four categories: Developed, BRIC, Developing and Underdeveloping (own, arbitrary, classification). When linked to the World Bank classification it comes closest to the classification on income: low income, lower middle income, upper middle income, high income (http://data.worldbank.org/about/country-classifications/country-and-lending-groups#Low_income), see for reference a complete list of countries and their classification Appendix I.

- Developed countries are the historically established countries of the western world (Western Europe, US, Oceania). There is often sufficient experience and knowledge about planning processes, but it may be difficult to propose alternative

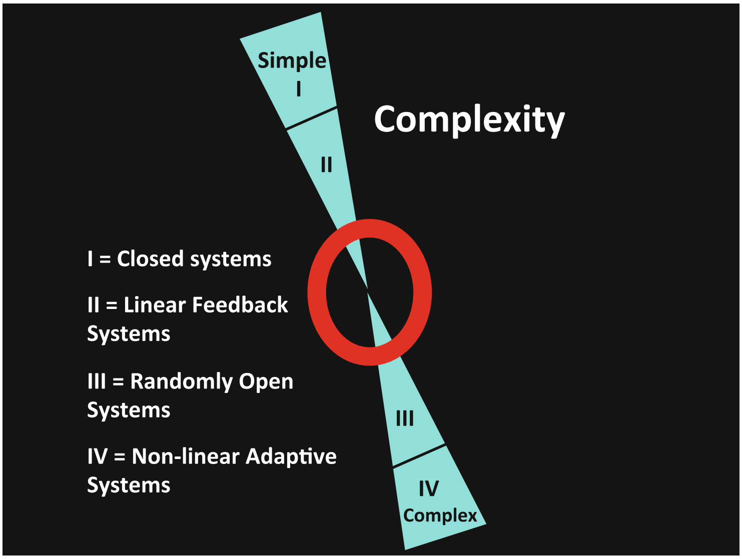

Fig. 2.5 Range of complexity

planning approaches. In dealing with stakeholders and the problems that are encountered with this, the search for new methods is on-going. In many cases there are there are sufficient resources available. Experience with sustainability as a subject and the meaning for planning processes.

- Growth rates in BRIC-countries (Brazil, Russia, India, China) are often firm as are the development rates. This makes it likely that projects are developed quickly. There is a high demand for new insights and knowledge.
- Developing countries are the countries that are undergoing change but at a slower pace than the BRIC countries. Eastern Europe, Middle East, Eastern Asia can be counted to this category. There is a driver to develop and engage in planning processes at a slower pace, but often these countries lack knowledge of innovative planning approaches.
- Underdeveloped countries are the poorest countries (large parts of Africa, parts of South America), where development is slow or absent. There is little resources and the possibilities to engage in planning processes are not abundant. Knowledge about planning processes and methods to involve local communities are less known (Fig. 2.6).

2.8.5 Scale

The fifth dimension is the scale of the project. The project site can be of a single building, an urban precinct or neighbourhood, but also ranging to whole cities or tows or even regional landscapes, metropolises and regions (Fig. 2.7).

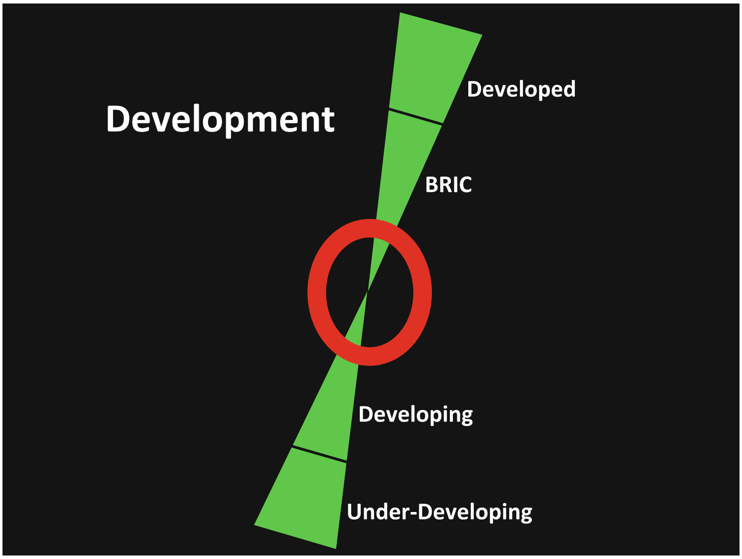

Fig. 2.6 Range of development

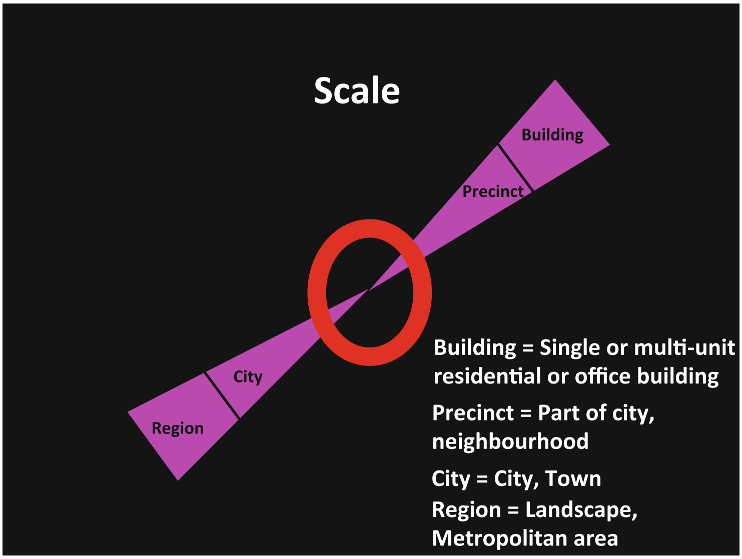

Fig. 2.7 The range of scale

2.8.6 The Charrette Wheel

When all five dimensions are combined the wheel for design charrettes arises (Fig. 2.8). The wheel makes it possible to determine each design charrette, whether it is a single building development in a developing country with landowners and

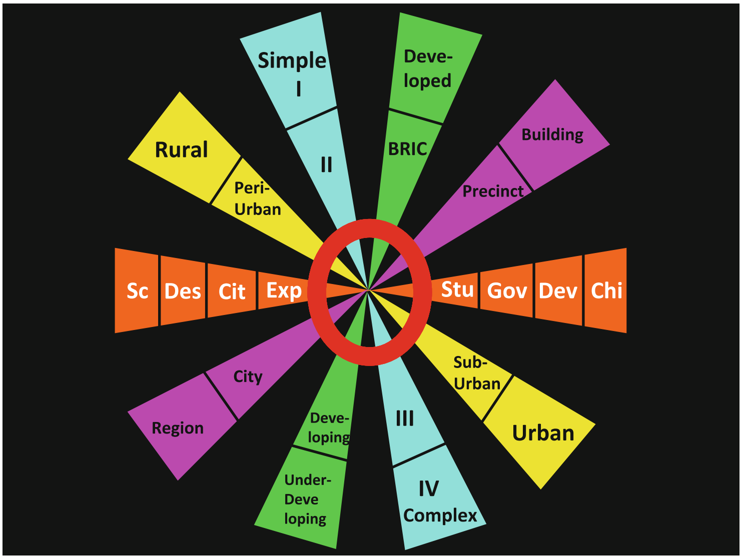

Fig. 2.8 Integrated 'charrette wheel'

local government involved or a charrette for an entire metropolis in a BRIC country, involving a wide range of participants. In each of the case studies a charrette wheel will be drawn.

2.9 Conclusion

As mentioned earlier design charrettes come and go in many different formats. The wide range has been shown in this chapter and will be elaborated in Part II of this book. Several dimensions determine the scope of a design charrette and there is not a single way to conduct a charrette in a successful way. The charrette wheel is an attempt to frame the wide range in five dimensions. This makes it possible to classify each design charrette in its own spider web diagram.

It may be clear that depending the location, the problem, the available resources and participants, the design charrette needs to be organised and designed in an appropriate way. The crucial element is that progressive learning of higher order is given the space to be developed over the course of the design charrette. Too dominant facilitation or too strict 'sticking to the program' can be counter-productive as it withholds participants from the ability to gain and create knowledge and to be able to learn from each other, the process and themselves.

Appendix I: Categorisation of Countries Based on Income Classes (World Bank 2012)

Low-income economies ($1,025 or less)

Afghanistan	Gambia, The	Mozambique
Bangladesh	Guinea	Myanmar
Benin	Guinea-Bisau	Nepal
Burkina Faso	Haiti	Niger
Burundi	Kenya	Rwanda
Cambodia	Korea, Dem Rep.	Sierra Leone
Central African Republic	Kyrgyz Republic	Somalia
Chad	Liberia	Tajikistan
Comoros	Madagascar	Tanzania
Congo, Dem. Rep	Malawi	Togo
Eritrea	Mali	Uganda
Ethiopia	Mauritania	Zimbabwe

Lower-middle-income economies ($1,026 to $4,035)

Albania	Indonesia	Samoa
Armenia	India	São Tomé and Principe
Belize	Iraq	Senegal
Bhutan	Kiribati	Solomon Islands
Bolivia	Kosovo	South Sudan
Cameroon	Lao PDR	Sri Lanka
Cape Verde	Lesotho	Sudan
Congo, Rep.	Marshall Islands	Swaziland
Côte d'Ivoire	Micronesia, Fed. Sts.	Syrian Arab Republic
Djibouti	Moldova	Timor-Leste
Egypt, Arab Rep.	Mongolia	Tonga
El Salvador	Morocco	Ukraine
Fiji	Nicaragua	Uzbekistan
Georgia	Nigeria	Vanuatu
Ghana	Pakistan	Vietnam
Guatemala	Papua New Guinea	West Bank and Gaza
Guyana	Paraguay	Yemen, Rep.
Honduras	Philippines	Zambia

Upper-middle-income economies ($4,036 to $12,475)

Angola	Ecuador	Palau
Algeria	Gabon	Panama
American Samoa	Grenada	Peru
Antigua and Barbuda	Iran, Islamic Rep.	Romania
Argentina	Jamaica	Russian Federation
Azerbaijan	Jordan	Serbia
Belarus	Kazakhstan	Seychelles
Bosnia and Herzegovina	Latvia	South Africa
Botswana	Lebanon	St. Lucia
Brazil	Libya	St. Vincent and the Grenadines
Bulgaria	Lithuania	Suriname
Chile	Macedonia, FYR	Thailand
China	Malaysia	Tunisia
Colombia	Maldives	Turkey
Costa Rica	Mauritius	Turkmenistan
Cuba	Mexico	Tuvalu
Dominica	Montenegro	Uruguay
Dominican Republic	Namibia	Venezuela, RB

High-income economies ($12,476 or more)

Andorra	Germany	Oman
Aruba	Greece	Poland
Australia	Greenland	Portugal
Austria	Guam	Puerto Rico
Bahamas, The	Hong Kong SAR, China	Qatar
Bahrain	Hungary	San Marino
Barbados	Iceland	Saudi Arabia
Belgium	Ireland	Singapore
Bermuda	Isle of Man	Sint Maarten
Brunei Darussalam	Israel	Slovak Republic
Canada	Italy	Slovenia
Cayman Islands	Japan	Spain
Channel Islands	Korea, Rep.	**St. Kitts and Nevis**
Croatia	Kuwait	St. Martin
Curaçao	Liechtenstein	Sweden
Cyprus	Luxembourg	Switzerland
Czech Republic	Macao SAR, China	Trinidad and Tobago
Denmark	Malta	Turks and Caicos Islands
Estonia	Monaco	United Arab Emirates
Equatorial Guinea	Netherlands	United Kingdom
Faeroe Islands	New Caledonia	United States
Finland	New Zealand	Virgin Islands (U.S.)
France	Northern Mariana Islands	
French Polynesia	Norway	

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2.9.1 Useful Websites

http://www.designcharrette.com
http://charrettedesign.com
http://www.charretteinstitute.org
http://www.cits.ucsb.edu
www.mt.unisi.ch

Chapter 3
Innovations in Organisational and Community Learning

Lisa Vos

3.1 Introduction

Human beings have an extraordinary capacity to self-organise and accomplish great results. We have proven so since ancient history. Mankind also has an amazing capability to learn collaboratively and to create innovative solutions by combining a diversity of multiple perspectives, brains, personalities and ideas. Despite overwhelming evidence of the effectiveness of self-organising systems, the dominant approach to organising and design is top-down, structured and planned. In this chapter the argument is made that the dominant mental model and approach in organisations and in learning are ineffective in the face of most of the challenges people and organisations need to handle today. An alternative way of thinking and acting is needed to effectively deal with adaptive challenges. One possible alternative model is that of self-organisation and collaborative learning. The dominant mental model will be explained first, then a framework will be introduced which helps discern in which circumstances this model is effective and which circumstances require a different mind-set. Then self-organisation is offered as an alternative mind-set. When self-organisation is applied to knowledge creation and innovation, "collaborative learning" is discussed as mental model and as a set of methodologies. The argument will be made that collaborative learning methods have proven to create novel solutions to wicked problems, enabling input from many and diverse stakeholders, establishing ownership and alignment and doing all this more efficiently than traditional top-down learning models. The chapter will draw on research and publications on the nature of learning in social contexts, organisational and

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system change, chaos theory and complexity theory. In addition the author's professional experience in Organisational and Leadership Development in The Netherlands, Australia and New Zealand provides a source of data.

3.2 The Dominant Mental Model: Newton's Mechanics

The Organisation as we know it is not a God given 'thing' that has been around since the beginning of human existence. It is a human creation and in fact a relatively recent one. We have invented this hierarchical top-down structure with formal role descriptions, communication lines and a power distribution which allocates the power to think and decide to a small number of people at the top, presuming they know best, and allocates the power to execute and act on those decisions to the people at the bottom, who are presumed to be similar, mutually replaceable parts which need to be externally motivated by middle managers. It is worthwhile noticing a few characteristics of the collective mind-set that was dominant in the time that we created The Organisation, the time of the Industrial Revolution. Thanks to the inventions of the "new" science of that era, business needed to organise itself on a large scale for the first time. The steam engine and large factories enabled mass production, railway lines enabled mass transport and new communication media (mass printed newspapers, telegraph lines) enabled mass marketing. Chandler refers to these developments as a "historical increase in economies of scale and scope" (Chandler 1990). Where previously the owner of the company would be able to oversee the running of the business, now professional managers entered the stage, which were in charge on behalf of the owners of the capital. Masses of people who were formerly working as farmers, craftsmen or tradesmen in mostly rural communities were now flocking to the cities to man the new machines.

The dominant mind-set of the time was fed by the enthusiasm and promise of the new scientific discoveries and inventions. This new science was predominantly based on the seventeenth century science as represented by Isaac Newton: rational, logical, orderly, predictable and controllable. The dominant branch of science was mechanics, which led to the creation of brilliant new machines. Modern medical science had only just started and the humanities like psychology and sociology did not have a place on the scientific radar yet (Fig. 3.1).

In addition, there were two examples of powerful large-scale organisations known at the time: the army and the church. Characteristics of both examples were: top-down hierarchical; structured; with a separation of the thinking and the acting; with powerful rules about what to think and do. In these organisations most of the knowing and deciding was to be done by "the few" at the top and most of the acting without asking questions was to be done by "the many" at the bottom. One could grow in power, status and salary by climbing the hierarchical ladder, which was done by playing by the rules and 'being a good soldier'.

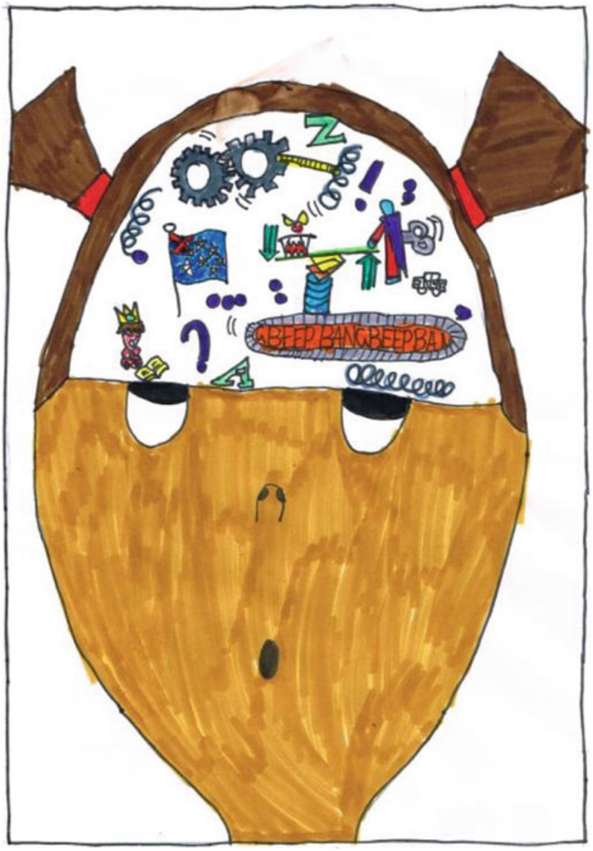

Fig. 3.1 Mechanistic mental model (Drawing: © Inez Roggema)

So it should come as no surprise that The Organisations that were created during this time mimicked the characteristics of the dominant mental models and the known examples of the time: they were created as top-down hierarchical structures and resembled many aspects of machines. They were supposed to be logical, rational, structured and planned. Its parts were to be mutually replaceable, with no mind of their own, merely supposed to carry out orders that were decided on at the top. As people tend not to enjoy being depersonalised and deprived of their capacity to think AND act, they need to be motivated externally by higher ranking officers, either by punishment or by reward. This organisational model replicates the mechanistic worldview complemented with the positional power distribution of church and army.

This is the organisational model we inherited and which is still dominant today. In summary, the assumptions that underpin this model are:

- The world is orderly, certain, predictable and controllable

- Difficult problems can be solved by dividing them into the composing parts, scientifically analysing them and reassembling them in a different and better way.
- Knowledge sits with a few people who 'know best', hold the most crucial information and hold the capacity to take the best possible decision
- People are similar in their skills, drives and motivations and are mutually replaceable
- Because people at the bottom only see their small part of the system, they need to be externally motivated by others; good work gets done by instruction and control.

To a certain extent these assumptions have held true and in those circumstances this type of organisation has worked quite well. We have been able to handle many large scale issues by reducing them into their parts, analysing them using our scientific methods and deciding on better mechanistic structures to deal with them more effectively. So what is the problem?

3.2.1 The Problem

The problem is not that his traditional mental model of organising is 'bad' or that we should get rid of it all together. There are issues that are dealt with effectively by using a structured, planned and reductionist approach. One problem is that the assumptions that underpin the effectiveness of the mechanistic model might hold true in some cases, they are clearly untrue in the majority of circumstances as experienced by people in organisations and in learning situations. In fact, most leaders of organisations would describe their world as highly uncertain, ambiguous, unpredictable and uncontrollable. The issues and challenges that arise in this uncertain and ambiguous world are of an entirely different nature than the ones that were effectively dealt with by the reductionist analytical approach. Yet, the majority of leaders in organisations still approach these different challenges in the same old mechanistic ways. Examples of Newtonian interventions in modern organisations in response to difficulties are: restructuring, creating a new division/team/task force, changing management, asking for more resources (the common term used for "people"), and bringing in external experts. Change the machine, fix or replace parts that are not working, realign the flow in the factory. All done by well educated people with all good intentions. The problem is that we keep applying a mental model to circumstances that are inherently different than the ones for which it was created. An additional problem with the mechanistic mental model is that by applying it to organising social systems we have organised the meaning out of our organisations. We deprive the majority of people of their sense of ownership, meaning and contribution and we lose the value of knowledge of "the many". People are being reduced to cogs in a machine.

3.3 Tame and Wicked Problems, Technical and Adaptive Challenges

Before moving on to an alternative mental model to the mechanistic one, it is helpful to look into the different nature of different problems in a bit more depth. Why are some problems not so much 'more difficult' than others, but rather 'difficult in a different way'? What exactly is the nature of those problems and how might we discern when which mental model would be most effective? The work of Ralph Stacey (Stacey 1999) provides us with a lot of insight into social systems, derived from complexity theory. The following is a model that has proven to be helpful in framing the different nature of circumstances in which organisations function, the different nature of 'problems' associated with these and thus the different approaches in dealing with these problems that would be appropriate. It is commonly referred to as the Certainty/Agreement Matrix (Stacey 1999).

Stacey distinguishes two dimensions which he puts on two axes of a grid (see Fig. 3.2). The first dimension, on the horizontal axis, is the degree to which a situation is considered to be either close to or far from certainty. Where one is close to certainty, it is more or less known what will happen next, one can predict the near future reasonably well. Cause and effect linkages can be determined; the outcome of actions can be predicted based on experiences from the past. Likewise, when one is far from certainty the future is unknown and cannot be predicted.

The second dimension, on the vertical axis, is the degree to which there is agreement on the best course of action to take. When one is close to agreement, there is

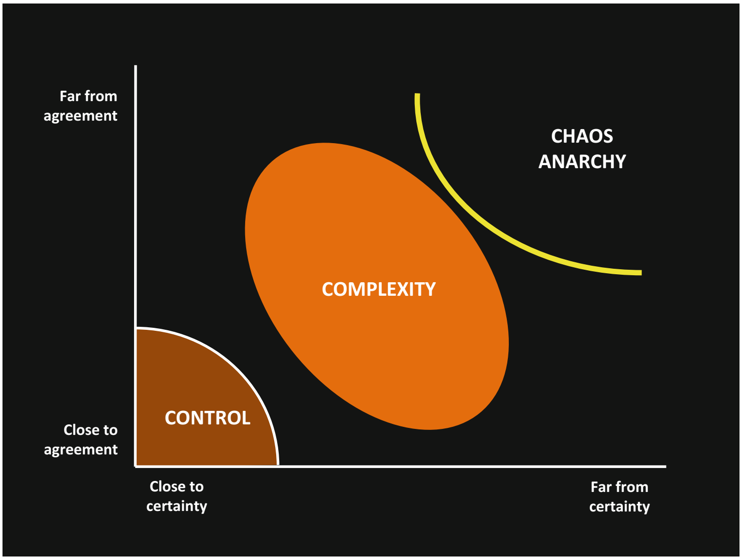

Fig. 3.2 Certainty/Agreement Matrix (Adapted from Stacey 1999)

broad consensus on what the best solution to the problem would be. When one is far from agreement, there is a diversity of views on what to do next and each view might be equally true and valid. When put on two axes as shown in the figure above, the two dimensions create a grid that maps different types of circumstances in which organisations function. Stacey identified five distinct zones within the grid (Stacey 1999). For the purpose of this chapter the discussion is limited to three. In the bottom left hand corner, situations are relatively certain and there is a large degree of agreement on what to do. This area can be referred to as the area of “Control”. Examples from organisations of this area are parts of the business where routine behaviour and procedures are effective. Problems might be very difficult and complicated, but the expertise and methods required to deal with them is known and available. This is the area where traditional management & control are effective, procedures and systems are helpful, operational excellence is a relevant aim.

At the top right hand corner, far from certainty and far from agreement, is the area that Stacey refers to as “Chaos” or “Anarchy”. The uncertainty and disagreement are so high, that there are no reasonable things one could do to solve an issue. The system might glide into anarchy or disintegration. Another potential response Stacey notices is avoidance. In Stacey’s logic this area of Anarchy is not productive and organisations would be wise to avoid it.

The area between “Anarchy” and “Control” is the area which Stacey calls the zone of “Complexity”. Others call it the “Edge of Chaos”, where the potential for innovative breakthroughs is high. The term “Turbulence”, as used by Emery and Trist, contains similar meaning. They referred to an organisational environment as ‘turbulent’ when “the dynamic properties arise not simply from the interaction of the component organisations, but also from the ground itself. The ‘ground’ is in motion” (Emery and Trist 1965). This area of “Complexity” or “Turbulence” is where most of our current day challenges occur. The environment is ever changing, ambiguous and the near future is unpredictable. There are multiple views on what is ‘right’ and different agents in the system each hold crucial pieces of knowledge.

Issues or challenges that occur in the area of “Turbulence” are difficult in a different way than problems in the “Control” area. In “Control” problems are difficult because they are complicated: they consist of many different components and it requires expertise to solve them. Yet, the type of problem is known, it can be understood within the known frames of reference, it can be decomposed and solved, provided that the right expertise is available. This type of problem is also referred to as ‘tame’ as opposed to ‘wicked’ (Rittel and Webber 1973). The distinction between ‘technical’ and ‘adaptive’ problems is relevant here (Heifetz and Linski 2002). With a ‘technical challenge’ the know-how and procedures to solve the problem are available. The issue can be dealt with in an ‘expert’ way. With ‘adaptive challenges’ the problem itself cannot easily be understood, there is no quick fix that can be provided by an expert. Solutions have to be novel and require a shift in thinking. The road to a solution consists of experiments and new discoveries which involve multiple people from the organisation or community (Heifetz and Linski 2002). A ‘wicked’ problem is used to describe complex multidimensional problems, with incomplete, contradictory or changing requirements (Rittel and Webber 1973). Problems located in the bottom left hand corner of the Stacey grid, which can be characterised as ‘tame problems’ or ‘technical challenges’, can be effectively dealt with by using methods that stem from a Newtonian mechanistic mind-set. For example: well-trained surgeons can perform difficult heart surgery by applying their expert knowledge and skill and following procedures. However, with ‘wicked problems’ or ‘adaptive challenges’ which occur in the space of Turbulence or Complexity, a different mindset or mental model is needed.

3.4 An Alternative Mental Model

3.4.1 Self-Organisation

In situations of a high degree of uncertainty and a low degree of agreement on the best course of action, there are no known solutions; there is no single right answer. It is irrelevant to look at experts to come up with the solution, since there is none. What is needed is an open exploration of all aspects of the problem, a joint process of data gathering and sense making that involves many people. These views might even be paradoxical or contradictory. Most of all, there is a need to draw on the full capacity to think and act of multiple people involved.

Where the traditional default ways of organising and responding to problems is rooted in the mechanistic science, it pays off to consider developments in science as they evolved in later eras, most notably in the twentieth century. Research on quantum physics (Capra 1982, 1996; Wheatley 2006), systems thinking (Beer 1975; Senge 1990; Wheatley 2006), and chaos and complexity theory (Capra 1982, 1996; Prigogine and Stengers 1984; Kuhn 1962; Peters and Wetzels 1997; Homan 2005) have offered critical new insights in the nature of complex problems. As with seventeenth century mechanics, these insights offer useful mental models to apply to social systems as well. A useful alternative mental model that emerges from these branches of science is the model of Self-Organisation (Morgan 1986; Wheatley 2006; Senge 1990; Peters and Wetzels 1997; Swieringa and Wierdsma 1990) or Complex Adaptive Systems (Stacey 1999). A self-organising system is seen as a collection of individual agents, each acting autonomously in a purposeful way, interconnected and influencing each other’s behaviour in multiple visible and invisible ways. Many examples are known from nature, where highly effective self-organisation occurs in complex flocking of birds, schooling of fish and swarming of bees. Ecosystems, water systems and the human body are other examples of systems that create and maintain themselves, combining forces of change and stability to adjust and adapt to ever changing circumstances, constantly changing shape yet maintaining their core identity. Processes of organisation occur, not planned and controlled by a single entity, but by the complex interaction of autonomously acting individual agents. There is order, but not by design and control from ‘the top’, but rather emerging from within the system. The system behaves purposefully and

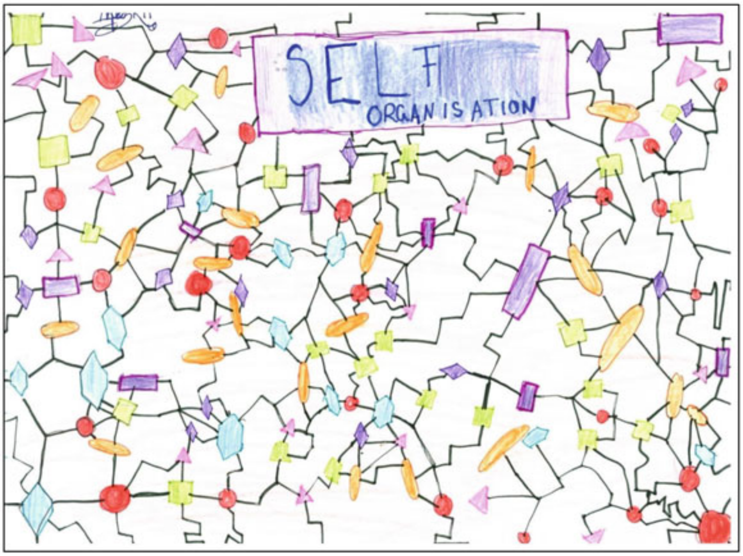

Fig. 3.3 Self-organisation (Drawing: © Inez Roggema)

produces highly complex forms in response to triggers from its environment. It is proposed here to apply a self-organising or complex adaptive mental model to social systems and it is argued that this lens is useful in helping social systems deal effectively with 'wicked problems' or 'adaptive challenges' (Fig. 3.3).

Human beings have the capacity to effectively self-organise and accomplish remarkable results. In addition to the examples from nature and physics, there are many examples of human systems that show effective self-organisation. Large scale examples are social changes like the recent revolution in the Middle East, which started with a single florist in Tunis burning himself, thus igniting a revolutionary fire that spread throughout the region; responses to crisis, like the 7,000 ordinary Australians who went to Queensland after the 2011 floods, and were effectively helping cleaning up people's houses within a day without instruction or control. Smaller scale examples are jazz orchestras that improvise and perform at a high level without the guidance of a conductor and countless small scale examples in our organisations where teams of people connect to get great work done without (or sometimes despite) instruction by management, sometimes breaking organisational rules and procedures to make sure problems are fixed. These examples demonstrate the extraordinary capacity of human beings to self-organise, think and act together to achieve a common purpose, without formal structure, plan or management.

'Wicked problems' or 'adaptive challenges' require the capacity of multiple parties and people to think and act purposefully together. They require deliberate experimentation and discovery. They require abundant sharing of information about 'what works' and 'what doesn't work' and the acceptance that there is no expert with the single right answer. They require the mandate for individuals to act locally and immediately, informed by the most recent information. They require the permission to take calculated risks and to “fail early in order to succeed sooner” (Brown 2009). Structures are fluid and temporary and exist as long as they are helpful. Rather than by an elaborate web of role descriptions, accountabilities and formal communication lines, organisational effectiveness is achieved by establishing and monitoring a small set of “simple rules” (Wheatley 2006). Elsewhere it is referred to as “minimum critical specification”, the “facilitating or orchestrating role managers and organisations can play, creating enabling conditions that allow a system to find its own form” (Morgan 1986). The choice of which specific “simple rules” are relevant depends on the context and situation of the system. But a few commonalities can be derived from different sources of research about the type of simple rules that are in place whenever effective self-organisation occurs:

1. **Common purpose, meaning or identity**
   Effective self-organisation requires a strong sense of common identity, meaning or purpose. In addition individuals need to be able to connect an individual sense of meaning to this overall identity, either consciously or subconsciously. In the case of flocking birds this common identity can be described as ‘survival of the flock’ and related to this an ‘increased likelihood of survival of the individual’. With the Queensland flood help the shared purpose is ‘to help people (clean their houses) in an emergency’. Individuals connect individual meaning to this purpose that can be described as the ‘desire to help others’ or ‘the desire to act and do the right thing’. A clear sense of identity and common purpose gives direction to the behaviour of individual agents and to the behaviour of the system overall. Identity is the key ‘boundary’ that provides containment for the complex of individual drives and actions and enables commonality and purposefulness to exist amidst conflicting forces and ambiguity.
2. **The nature of relationships, connections, interaction**:
   It matters in which way individual agents in the system are ‘supposed’ or ‘allowed’ to relate to each other and interact with each other. These terms are inadequate in the sense that they seem to imply a ‘controlling or permitting’ entity. What is meant is that effective self-organising systems have a rule that governs the way individual agents relate and interact. This rule is not designed by an ‘expert’ or ‘manager’ but rather it has emerged from the system’s behaviour itself and/or is agreed upon by the members of the system. In nature and large social systems this is solely an emergent process in which rules get ‘codified’ or reinforced when they improve the system’s chances to achieve their purpose or maintain their identity. In organisations this rule can be established via a joint process of dialogue, discovery and agreement. Examples of this type of rule in nature: in complex flocking each bird will follow the bird in front of it, yet will avoid colliding with it. In Organisations an example could be: ‘we will include anyone who has information that is relevant to the accomplishment of the task or who will be affected by the results’ or ‘we talk with each other and not about each other’.

3. **The flow of information through the system**:
   Effective self-organisation requires information to flow freely from where it is available to where it is needed. Whilst this sounds self-evident, most organisations following the mechanistic mental model demonstrate the polar opposite: information is highly controlled, compartmentalised, fragmented and confined to formal communication lines. Self-organisation requires each individual to be able and 'allowed' to act on local information immediately and autonomously, adjusting their behaviour in line with the common purpose and identity. Individual people or parts of an organisation need to have explicit and full permission to act locally based on local information combined with their best intent to help achieve overall purpose and individual meaning. The people who went to help in Queensland set foot on Queensland soil, were handed a bucket and a mop and could direct themselves to where they saw help was needed. When work was done they could individually choose to move on to a different house, join forces with other people or go home all together. Jazz musicians agree on a genre, tempo and key after which each individual applies the best of their skills autonomously to achieve superb musical quality.

3.5 Collaborative Learning

3.5.1 Self-Organisation in the Context of Learning

The basic ingredients for finding new solutions to problems are knowledge, information and ideas and the ways in which they can be made applicable to the problem context. Similarly as with organisations, the way mankind has approached education and learning has been mechanistic in nature since the seventeenth century. This mechanistic approach has been reinforced during the industrial revolution, when for the first time in history education was seen as relevant for more than just the elite and in the wake of labour liberation movements was made available to the masses. Where the classical principles of 'universitas' (from Latin: 'the whole', 'total', 'universe') and 'schole' (from Greek 'free space') advocated a broad offering of multiple disciplines that could meet in an interactive and conversational approach, leading to an emerging understanding and the creation of knowledge in students' minds rather than transfer from the teachers mind into the student's, the industrial age saw the establishment of institutionalised education systems the characteristics of which were similar to the factory type organisations that were created in the same era (Robinson 1999). Education was based on the assumptions that the correct knowledge was to be delivered by experts, students were at the receiving end until they had proven sufficient mastery, the disciplines were offered as separate streams or parts, without integration, education was reductionist, planned, orderly and rational. And in education and learning as well as in organisations this mental model of learning is still dominant today. And as with organisations, this 'teaching' style of learning works well as long as the problem context is 'tame' or 'technical'. Where the problem context requires novel combinations of different knowledge disciplines, high degree of input and ownership of multiple stakeholders and innovative knowledge creation applicable to a specific context, the mechanistic mental model does not work. The model of self-organisation offers a valuable lens on learning and knowledge creation that offers the potential of high quality, innovative solutions that provide answers to wicked problems or adaptive challenges.

Several scholars offer valuable insights and concepts that help frame different types or levels of learning. I describe five angles on this collection of insights and will then offer an integrated model representing different levels of learning.

3.5.2 Individual and Collective Learning

A first distinction which is relevant here is that between individual and collective learning processes (Homan 2001; Swieringa and Wierdsma 1990; Argyris 1992). Individual learning refers to transfer or creation of knowledge in individuals, increasing their individual ability to act. Collective Learning means more than the sum of the individual learning results. In collective learning processes collective sense making processes occur which not only add to individual capability, but also lead to increased capacity of the group to behave effectively as a collective. This collective learning can be extended to organisational learning (Argyris and Schön 1974, 1978; Senge 1990), "Team" Learning (Homan 2001) and Large Group Interventions, which aim at whole system learning (Bunker and Alban 1997). The distinction is relevant, because aspects of group behaviour, group dynamics and group life impact the learning as a collective, either in a helpful or in a hindering way. Effective collective learning requires knowledge and awareness of these areas of expertise. The focus in this chapter is on collective learning processes.

3.5.3 Learning Domain

A second variable to consider is the "Learning Domain" (Homan 2001), which is described as the area the learning is meant to be focused on, or that "which is formally on the agenda". The nature of the Learning Domain plays an important role in assessing which type of learning interventions would be applicable. If the learning domain is of a 'tame' or 'technical' nature, mechanistic interventions, like teaching by an expert, are effective. When people have a knowledge gap that prevents them from doing their job well, the best way to go is to offer them some formal training or teaching to fill that gap. Wicked or adaptive Learning Domains clearly would be better 'taught' in complex interactive settings.

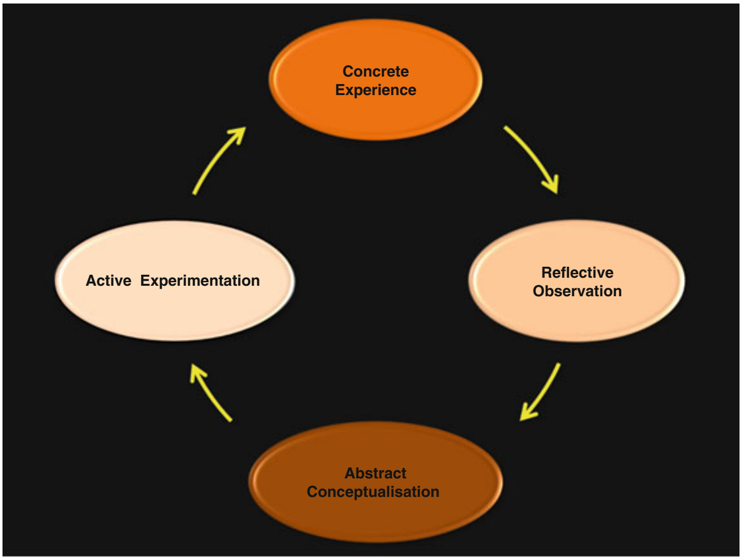

Fig. 3.4 Experiential learning cycle (Kolb 1984)

3.5.4 Experiential Learning

The 'Experiential Learning Cycle' (Kolb 1984) frames how learning actually takes place. The interventions need to encompass all four stages of a cyclical process (Fig. 3.4) for actual learning to occur, in the sense that you observe people 'doing' differently in the context of their learning domain.

There needs to be concrete experience ("acting"), conscious reflection on that experience, abstract conceptualisation, which can consist of expert knowledge being taught, books being read or other methods, after which a learner decides on new types of behaviour to experiment with in practice, which again leads to concrete experience, etc. So where traditional education almost solely focuses on transfer of expert knowledge onto learners Kolb's cycle implies that no meaningful learning will occur from that activity alone. Knowledge needs to make sense in the context of a learner's experience, which they could only gain awareness of by reflecting on that experience. And knowledge only makes sense if it would then lead to new behaviour experiments in the context of the learner's practice.

3.5.5 Depth of Learning Impact

Furthermore, it is important to consider the "depth" (Homan 2001) of the learning impact or the level at which learning occurs. In social systems the terms "single-loop" and "double-loop" learning are defined (Argyris and Schön 1974, 1978;

Argyris 1992). With single-loop learning there is "direct modification of the behaviour itself". "An error is corrected without questioning or altering the underlying values of a system", like in the example of the thermostat, which will adjust its behaviour when the actual room temperature is too high or too low compared to the set temperature, but which will not question the fact that it had been set to that specific temperature. In double-loop learning "mismatches between intended and actual behaviour are corrected by first examining the governing variables and then the actions themselves" (Argyris 1992). With collective double-loop learning, which is particularly applicable in social systems like organisations, this examining of "governing variables" involves getting an "understanding of the meanings people create when they deal with each other", surfacing mental models or value systems that might either support or hinder effective actions. In addition they stress that "the learning occurs in the action" and that acquisition of new knowledge should not be called "learning" yet. Single-loop learning is applicable to routine, repetitive issues and double-loop learning is needed for complex, non-programmable issues. The connection with the previously used terms 'tame', 'technical' problems and 'wicked', 'adaptive' problems cannot be made one on one. Yet it is fair to state that in the case of 'wicked' problems, single-loop learning will not be sufficient and that double-loop learning is necessary (Argyris and Schön 1974, 1978).

Referring to Conant and Ashby's "Law of Requisite Variety" (Conant and Ashby 1970; Homan 2001) identifies three levels of learning, each of which is applicable to a different level of "variety of the Learning Domain". "1st level learning" or "Framing" refers to applying current views to a task or problem. "2nd level learning" or "Reframing" means exchanging views and generating a shared set of new and richer views. A continuous and cyclical process of challenging existing views on an ever-fundamental level is called "breaking the frames" or "3rd level learning" (Homan 2001). The lower the level of variance in the learning domain, the more "framing" learning methodologies are relevant; the higher the degree of variance in the learning domain, the more the cyclical, continuous approach of "breaking frames" is needed.

3.5.6 Self-Organisation and Learning

Self-organisation and self-organising systems are useful metaphors in the realm of learning. Section 3.4.1 gives an overview of characteristics and conditions for self-organisation. The relevance of self-organisation for collective learning is demonstrated by a number of researchers (Senge 1990; Morgan 1986; Homan 2001; Mitra 2006). A few relevant examples of this research are mentioned here. The work of systems physicists in the area of cybernetics demonstrates how complex dynamics in systems influence the system's behaviour and the importance of considering the self-organising characteristics of system behaviour as instrumental in collective learning (Senge 1990; Morgan 1986). Morgan describes the learning capacity of organisations as a “brain metaphor”. The key characteristics of the brain are “requisite variety”, “learning to learn” (similar to double-loop learning) and “enhancing capacities for self-organisation” by applying “minimum critical specification” (comparable with “a few simple rules”) and “redundancy of functions”. Senge postulates Systems Thinking is the key “discipline” for establishing a “learning organisation” (Senge 1990) and describes similar “loop” mechanisms as in Organisational Learning (Argyris and Schön 1974, 1978).

Insights from Chaos Theory are seen as useful for understanding and creating collective learning. A few examples from research are mentioned here. “The self-organising, self-referential and autopoietic nature of chaotic behaviour in systems” cause new order emerging from chaos in systems that are out of equilibrium (Homan 2001). “Transformational learning at the 3rd level in response to wicked problems occurs by increasing the complexity in a system or bringing it out of equilibrium, so new order can emerge”. “Group Learning processes are in principle complex unstructured processes of a self-organising nature”. Chaotic and self-organising processes can help new insights and solutions emerge.

The “Hole in the Wall Project” (Mitra 2006) demonstrates another example of the self-organising nature of learning, in response to a challenge which was inherently wicked: “The areas in India where the need for outstanding teachers is exceptionally high are the areas where outstanding teachers are least likely to go to”, i.e. teaching primary school age children in poor areas in India. In the “Hole in the Wall” project internet connected pc’s are placed in a hole in a wall and left to local children to find their way with it. What these children would be able to learn together is noticed and recorded, leading to the proposition that “education is a self-organising system, where learning is an emergent phenomenon” (Mitra 2006).

3.5.7 Integration: Learning at 3 Levels

An integrated representation of levels of learning, complexity of the issues in the learning domain and learning interventions is found in Fig. 3.5.

The vertical axis represents the Learning Objectives at different levels of learning with “information transfer” at the bottom end, “skills and competency building” at the intermediate level and “mental model shift and knowledge creation” at the top end. The horizontal axis represents the Delivery Approaches, ranging from “Instructor/Expert centred”, via “Learner centred” to “Team, Partnership or Community Centred”. Combined these two dimensions show collections of learning technologies that are applicable to an increasing level of complexity of both Learning Domain and learning approach as you move from bottom left hand side of the grid to the top right hand side.

At the bottom left hand side one finds methodologies which are based on the mechanistic mental model, referred to here as “Distribution Technologies”. The assumption is that knowledge is held by the expert and is transferred to receiving

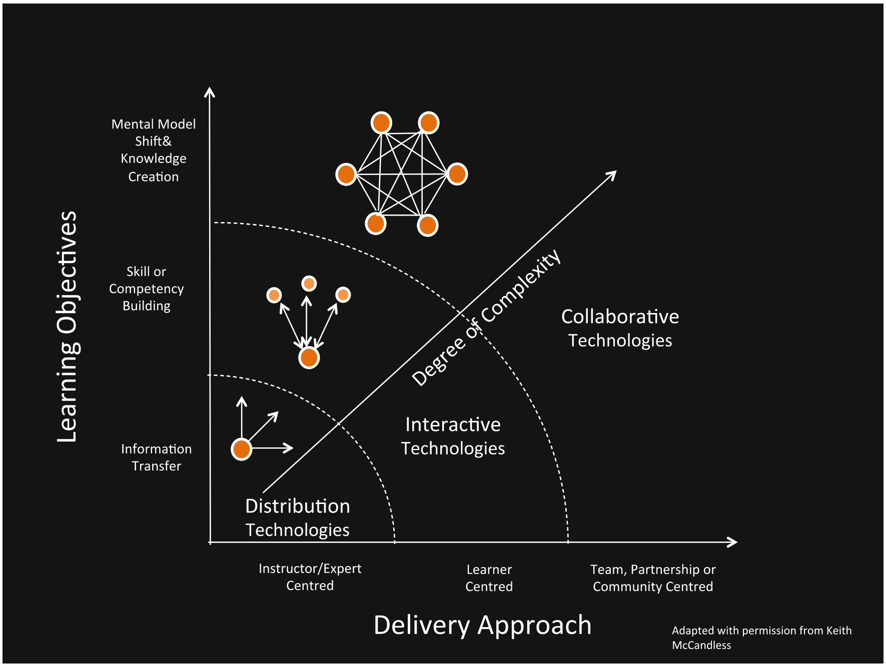

Fig. 3.5 Learning at three levels

non-experts in one-way traffic often referred to as "sending information".[1] All knowledge is known and pre-existing, the expert knows the right and correct set of knowledge, the expert decides what is relevant for recipients to learn and which would be the best way to learn it. Once the information has been transferred, the assumption is that the recipients will know how to apply it to known problems in known situations. This level of learning is individual and single-loop; applicable in 'tame' or 'technical' Learning Domains.

Interactive Technologies are characterised by two-way traffic, a combination of sending and receiving expert information and responding to that information by learners. The assumption is that experts still know better than learners, but the way in which learners can use new skills in their context is crucial. The interaction between learners and experts partly determines the content and approach of the learning. This is still single-loop learning, since the objectives are known in advance. The interactive process provides feedback loops that inform the learning process, but the learning objectives themselves are not up for discussion. It is also still individual learning. Whilst interpersonal interaction might be part of the learning domain and approach, at this level there is no conscious use of collective sense-making processes or the generation of changed collective mental models or values.

[1] Please note that the metaphor itself of the transmission device with a 'sender' and a 'receiver' is highly mechanistic.

This level of learning is often aimed at increasing participants' level of competencies against the values of a predefined 'competency framework'.

At the highest degree of complexity we find Collaborative Learning Technologies. These are based on the assumption that relevant knowledge is present in all members of the learning setting, in 'facilitators' and 'learners' equally. There is no single right answer, no differentiation in 'experts' and 'non-experts'. Knowledge is created in a collaborative process which is characterised by self-organising processes encompassing multiple connections and interactions between all group members, most commonly in combinations of individual, small group and large group activities, using learning activities that include the four cycles of Kolb's Experiential Learning Cycle (Kolb 1984). Learning is collective, "breaking the frame" and double-loop. Sharing a diversity of multiple perspectives is used to generate a new shared set of meaning in order to produce novel effective behaviour. Examples of Learning methodologies at this Collaborative level are multidisciplinary design sessions, Large Group Interventions (Bunker and Alban 1997; Homan 1998), Action Learning Methodologies (Revans 1980), Appreciative Inquiry (Cooperrider and Srivastva 1987; Cooperrider et al. 1995, 2008), dialogue methods, World Café (Brown and Isaacs 2005), whole system adaptive change approaches and projects like the "Hole in the Wall" (Mitra 2006).

To generate new knowledge in order to create novel solutions to 'wicked' or 'adaptive' problems, Collaborative Learning Technologies (CLT's) are indispensible. Collaborative Learning interventions aim at the 3rd level or transformational learning (Homan 2001). They require challenging of current mental models and belief systems, make use of the input and commitment of many stakeholders. CLT's involve collective learning and sense making processes in which new shared views and mental models are created, which then serve as new and more effective Theories-of-Action (Argyris and Schön 1974, 1978; Argyris 1992). In addition, interventions in this Collaborative Learning realm are inherently cyclical and non-linear in nature, using self-organising processes to create ever new responses to changing situations.

Figure 3.6 provides an overview of the three levels of Learning Technologies with their characteristics.

3.6 Assumptions, Characteristics and Conditions for Collaborative Learning

3.6.1 Assumptions

In summary the effectiveness of collaborative learning approaches is based on the following assumptions:

- The context is unpredictable, turbulent and ambiguous
- Problems (the learning domain) are of a wicked or adaptive nature

	Individual or collective learning	Nature of learning domain	Kolb experimental learning cycle	Depth of learning impact
Distributive	Individual	Tame problems Technical challenges	Conceptualisa-tion only	First level learning
Interactive	Individual	Tame problems Technical challenges	Conceptualisa-tion and experimenting with new behaviour	First or second learning level
Collaborative	Collective and individual	Wicked problems Adaptive challenges	All stages of cycle (and multiple times)	Third learning level

Fig. 3.6 Framework of learning technologies

- There is no single right answer, there is no expert who can provide the solution; knowledge and ideas resides in many agents
- There are no known or fixed solutions, the problem itself is multidimensional
- Solutions require input of multiple stakeholders and the ownership and commitment to execute the solutions from multiple stakeholders
- Solutions require new ways of thinking rather than applying old knowledge to a new situation.

The collection of Collaborative Learning methodologies itself is broad and diverse, the examples in the previous section are just a few. The research referred to in this chapter so far provides a broader range of practical examples.

3.6.2 Characteristics

Whilst it is impossible to give a comprehensive list of examples of Collaborative Learning Technologies (CLT's) here, there are a number of commonalities in their characteristics and conditions that are worth describing. CLT's are characterised by a high level of energy in all participants, which ebbs and flows from highly active to highly reflective and back. The energy is created by the fact that work is done on real world issues that participants experience as relevant to in their context, combined with the freedom to contribute their best. This leads to a high level of intrinsic engagement, commitment to put in their best effort and preparedness to take responsibility for the outcomes, decisions and actions that result from the intervention. In addition to the content and outcomes, participants experience a safe holding environment, in which they feel free and able to have frank conversations, surface mental models and work through potentially difficult issues. The process is often referred to as 'liberating' and 'rewarding', whilst also 'exhausting'. Commonly CLT's lead to results which participants had not thought possible beforehand and breakthroughs in processes that had been 'stuck' for a long time (sometimes years or even decades). Whenever there is a systemic issue which requires input from multiple stakeholders, commitment and ownership by those multiple stakeholders, alignment of individual and collective identity and objectives, speed and timeliness, Collaborative Learning methodologies are the most effective and impactful approach (Bunker and Alban 1997). In addition, the shared experience helps build a common base of experience knowledge, sense of 'common ground' and appreciation of differences. A CLT can help break down the "walls" between different parts of the system ("siloes") and build a community: members develop an identity which is connected to the whole rather than to the parts. Identity becomes more 'whole of system' rather than 'my team' or 'my department'.

3.6.3 Key Process Steps

Three high level process steps are crucial for creating constructive CLT processes: Thorough Preparation, a Holding Environment and Closure.

1. **Thorough preparation**
   Most people would consider the actual events with participants in a room as 'the work'. In actual fact the scope of 'the work' is much broader and includes the process before you actually have people in the room. The importance of a thorough preparation cannot be underestimated. This preparation is ideally done with a 'Design and Preparation Team' which includes a representation of all key stakeholders to the issue. The purposes of Design and Preparation are to establish a shared understanding of the issue that should be dealt with (the Learning Domain), the purpose and objectives of an intervention, potential approaches and ultimately a structure and agenda for the intervention. It is crucial to dig deep enough to surface the issue that should really be dealt with, explore mental models that might be keeping those issues in place and start building permission with different stakeholders to stretch their comfort zones and challenge their assumptions. Responses to the intervention in the Design Team are often a good

predictor of responses of the larger system. These data can further inform the design in structure, methodologies, activities and facilitation styles of the actual intervention. The learning work is being modelled in this preparation process, approaches can be tested and collective sense making processes within the Design and Preparation team lead to a genuine and "felt" ownership of and commitment to the design.

2. **Creating a Holding Environment**
   To create a free flow of information exchange, in which mental models can be explored and shifted and new content can be created, without this process escalating into chaos, a "few simple rules" need to be in place. At the start of the actual event it is crucial to "set up the learning system" and explicitly contract with all participants on a few aspects of the learning approach. A good holding environment consists of a safe web of relationships and boundaries within which people can freely share their ideas and concerns and can work through potentially difficult issues. Creating this holding environment starts with providing clarity on purpose, objectives and intent of the intervention; then providing clarity about the structure and flow of the day(s) and explanation of the different learning settings that will be used. The learning approaches and the nature of activities should be made explicit and explained if needed. The second step consists of explaining the importance of safety and confidentiality within the boundaries of the learning intervention. This applies particularly when the Learning Domain has issues to which participants might have emotional responses. Participants are asked to explicitly agree to guard this confidentiality and safe learning environment. It is then useful to do a whole group activity in which participants are invited to explore some of their initial responses to the topic of the intervention. Depending on the nature of the learning domain and purpose of the intervention it is more or less crucial to establish a climate in which potentially difficult emotions are legitimised and can be surfaced in a constructive way. Firstly, to prevent these emotions from 'firing up' and leading to defensive routines rather than learning; secondly to use these emotional responses as potentially useful data while working on the learning domain.
3. **Closure**
   It is important to mark each time boundary in an event or series of interventions with good and explicit closure. The nature of this closure will be different for a 1 day event than for a longitudinal process of multiple events and interventions. Important elements of good closure are: an explicit sharing of the learning experiences and the new 'sense' that has emerged on issues in the learning domain; any agreement on outcomes that have been achieved; if appropriate an explicit agreement on actions or next steps to take; agreement on how to engage people who did not attend the event in the process and outcomes; agreement on how to capture and process the data and information that were generated; collective reflection on the processes and experiences during the event.

3.6.4 Practical Design Principles

The following 12 practical design principles have been proven to be helpful in most CLT's:

1. Establish a **clear and explicit understanding of the learning domain** and objectives. This should be an issue which is "real", relates to the participants' real practice, the solution of which is relevant to each. The issue should be systemic (cross boundaries, cross hierarchy, multidimensional and affect multiple people at multiple levels) and of a wicked nature. It does not make sense to create an intervention with high complexity when the issue could be easily dealt with by a small subset of specialists. A clear purpose is one of the factors that provide containment for the productive energy of a large group of people and for emotions that might surface when a group starts engaging with challenging issues.
2. Get the **Whole System in the Room**: it is crucial to invite all relevant people to participate. Once the learning domain has been agreed on, the issue could be rephrased as a purpose statement. Then everyone who is needed to achieve this purpose should be part of the intervention. It is important that key decision makers who are relevant to the issue are involved, present and visible.
3. **Mandate and permission** from key decision makers to work in the adaptive realm and challenge the current belief systems. It is good to have a clear sense of the boundaries of the playing field: which things are up for discussion, which are not? Which are the degrees of freedom with which participants can approach potential solutions?
4. Organise **multiplicity and diversity of voices, points of view and perspectives**. New shared meaning and novel solutions to wicked problems can emerge from a constructive 'clash of opposites'. If views are too similar from the start, a group might move into solution mode very early and defer to 'safe' single-loop learning rather than engaging in the more challenging double-loop 3rd level learning.
5. Structure the activities as **combinations of individual, small group and large group** conversations, interspersed with collective sharing and sense making. Conversations will be structured as dialogues rather than discussions, aimed at generating many views rather than agreeing on one best. Deep listening and inquiry are the preferred communication styles, enabling open, frank and explorative conversations.
6. Common database and **free flow of information**: every participant should have equal access to all information available and there needs to be permission and infrastructure that allow information to be shared freely.
7. **Equal participation**: everyone's contribution is equally valuable. The design of the intervention needs to enable a conversational flow in which hierarchy or expertise do not have a perceived advantage.
8. In many CLT's the creation of a **shared image of a preferred future** plays a powerful role. It provides stretch between the 'now' and 'desired future', which creates tension that generates action and commitment.

9. Build in **time for reflection and 'break through moments'** regularly. Reflection is a crucial activity in 3rd level learning and is easily overlooked in our action biased western culture. Conscious reflection on new sets of information and on complex experiences is pivotal in the process of individual and collective sense making.
10. **"Touching the data"**: it helps when participants are required to do a lot of capturing of ideas and reporting back themselves on "touchable" media (post-its, flip charts, objects, modelling), which forces everyone to be explicit about their ideas.
11. **Perfect organisation and logistics** (room set up, catering, materials) to ensure smooth and seamless delivery of the intervention. Bunker & Alban refer to this as the "Zamboni principle", creating a process without glitches or unexpected bumps.
12. **Data Assist team**: the amount of information shared and generated is vast and of diverse nature. It is important to keep as much of this diversity alive and present and retain the "rich picture". It is valuable to have a specific group of people who have the task of capturing and collecting *all* data generated and assisting in reporting back to participants and people who did not attend the intervention.

3.6.5 Role of the Facilitator in Collaborative Learning

The previous sections have made it clear that in Collaborative Learning Technologies there is no place for a traditional 'mechanistic' top down expert who is in charge of 'leading the intervention'. It would be a mistake however, to conclude that there is no role for a facilitator at all. On the contrary, Collaborative Learning Methodologies require highly skilful design and facilitation to be effective. The facilitator's role is a crucial one, yet distinctly different from a traditional 'teaching' role. Facilitate means the process by which "the facilitator makes the group work easier and more effective by serving as a content-neutral guide to the process" (Kraybill and Wright 2006). Referring back to the three levels of learning as described in Sect. 3.5.7 and the Framework of Learning (Fig. 3.6), the assumption in Collaborative Learning Technologies is that each member of the learning setting holds relevant knowledge, the facilitator and the other members. The role of the facilitator in this is to help the group in and through *their* thinking process rather than thinking for them. He is catalysing rather than directive, enabling the learning process to occur rather than controlling it.

One crucial thing a facilitator of this level of learning must do is to take responsibility and initiative in key process steps as described in Sect. 3.6.3. This is where the expertise and craftsmanship of good facilitators in the space of Collaborative Learning are found. The facilitator must lead the joint process of preparation and design, help establish the containing boundaries of clear purpose and intent, structure, methodologies and time and strictly monitor these boundaries. The facilitator will ensure that good closure takes place on multiple levels. In addition a good facilitator needs to have mastery in guiding complex combinations of conversations, holding the space for the group to work on tough issues, monitoring and maintaining the level of energy in the room; all of this with the purpose, intent and flow of the event in the back of their mind at all times. He serves as the keeper of the structure, time and rules that were agreed on. He will help the group reflect in meaningful ways and will make sure small group outcomes are shared for collective sense making. Depending on level of adulthood of the group and the nature of the Learning Domain, the facilitator will surface emotional responses to the Learning Domain and offer the group to reflect on and work with those as learning data. A facilitator might also hold content knowledge which is relevant to the Learning Domain. If and when providing concepts or new perspectives is helpful in the overall flow of the learning process, the facilitator might offer their content knowledge, in the form of a lecture or by using concepts to help frame the understanding as it emerges from the learning process.

3.7 The Design Charrette

Design Charrettes are used in the context of architecture and spatial planning. This context can be described as highly complex and turbulent in nature (Roggema 2009, 2012) and provides challenges which are inherently ‘wicked’ or ‘adaptive’. Climate Change and the spatial consequences of this are on example of such a ‘wicked’ planning problem. Roggema (2009, 2012) demonstrated that traditional planning and design approaches are not well suited to handling these ‘wicked’ problems. These appear to follow the mechanistic mental model as described earlier in this chapter. Roggema developed a spatial planning approach using the self-organising mental model, drawing on chaos and complexity theory. He calls this approach “Swarm Planning”. Design Charrettes have proven to be a useful element in this Swarm Planning approach. The conclusion is drawn here that a Design Charrette is an example of a Collaborative Learning Technology and as such is an excellent tool to use as part of an approach to design solutions to ‘wicked’ planning problems. There are many Collaborative and Self-Organising aspects which apply to a Design Charrette.

The three key process steps are consciously taken before, during and after a Design Charrette. There is a thorough preparation in which all key stakeholders are involved. There is a clear purpose, structure and agenda and the flow and activities are made clear at the start. Thus there is a good holding environment. In the case of a Charrette this holding environment might be less relevant for containing emotional responses, but it does have the effect of liberating energy, creativity and diminishing participants’ reluctance to offer their ideas, even though ‘they might not be designers’. There is significant attention to closure, both at the end of the Charrette itself and in the process afterwards. The outcomes of the Charrette are solidified in a report which is shared and discussed with key stakeholders. Learning outcomes are sometimes published as part of academic papers or journal articles.

Many of the 12 design principles as described in Sect. 3.6.4 are applicable to Design Charrettes. The issue is 'real' and relevant to participants and the challenge is 'wicked' in nature. It is an explicit feature of Design Charrettes to have 'the whole system in the room' and decision makers of different levels are actively involved and usually participate in the Charrette. There is a diverse set of perspectives and voices. The group represents a cross-section of the community relevant to the issue, complemented with several external experts from a diverse background and other interested stakeholders. All participants become equal contributors in a collaborative thinking and doing process, once they are in the room. Relevant information that is available is shared at the start and information and ideas flow freely throughout the event. Intermediate ideas and outcomes are presented back to the whole group at set times and the flow of activities enables different subgroups to build on contributions of others. A collective understanding emerges which is made explicit by the facilitator at certain times and at the end. The creation of a shared future image could not be more explicitly present than with a Design Charrette. A Design Charrette is also a 'champion' in the use of "touching the data" in the most literal sense. Ideas are generated in small groups and immediately captured on flip charts, post-its, large print outs of maps of the region and eventually spatially modelled using coloured plasticine. The "Zamboni" principle and the Data Assist team are not widely used in Design Charrettes. It seems that the facilitators will certainly aim to prepare and handle the logistics well and often there will be a specific person who is in charge of logistics. In smaller Charrettes this role often falls back to the facilitator. And since the principles of self-organisation are part of the core expertise of good facilitators in this space, there might be a risk that the logistics are left to self-organisation and emergence as well. It is recommendable, particularly with large scale or multi-day Charrettes, to have a designated person or team to be in charge of logistics. Not only to apply the "Zamboni" principle and ensure a smooth process, but foremost to free up the facilitator's head space to fully tend to the Charrette's flow and process. A Data Assist team seems particularly relevant and useful for a Design Charrette. The amount of information and ideas generated is enormous and is captured in many forms. In current practice it seems to come down to the facilitators and the organising team to collect all materials and make sure everything is kept, digested and used in the Charrette report. Though this works well in practice, the use of a Data Assist person or team might a useful idea to keep in mind and try out.

The result of creating a Design Charrette using the steps and principles of Collaborative Learning is an event characterised by an extraordinary level of active energy and engagement of a broad range of participants, leading to the creation of truly innovative design ideas which are based on input from the relevant stakeholders. Because of this active involvement in the creation of designs, there is a high level of stakeholder ownership and commitment to the design solutions. Design Charrettes have proven to lead to innovative, relevant and 'owned' solutions to 'wicked' spatial design problems in the short time span of 1–3 days. They are truly an example of a self-organising 3rd level learning intervention.

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Chapter 4
Shifting Paradigms

Rob Roggema

4.1 Introduction

Apart from news articles and popular publications, design charrettes are not commonly found in academic literature (Anderson et al. 2010; Sutton and Kemp 2006). However, Schwartz characterized planning for the longer term, without calling it design charrettes. Aspects that are forming the basis for good design charrettes, such as 'creating a hospitable climate', 'include key decision makers and outsiders', 'look far ahead', 'begin by looking at the past (and present)', 'conduct scenario work in groups', and 'continue a strategic conversation permanently', form, according to Schwartz, the key elements of planning for the future (Schwartz 1991). The question of bringing the long term closer to present and, similarly, the global closer to the local, for instance in producing food and energy (Girardet and Mendonça 2009) is essential when planning for a sustainable future. 'Out there' are many people in communities have inventive and intelligent ideas about a sustainable environment, they drive change in the places they know best and meaningful participation helps them to better be able to deal with extreme (climate) events, reducing reliance upon external intervention (CES 2012). The way these kinds of abstract futures can be discussed in a way that they resemble to people living in the present is to organize methods for collaborative design and decision-making (Suzuki et al. 2009). Mutual exchange between stakeholders and decision-makers is organized in a participative model, in which leaders, team members, stakeholders and advisors and champions from academic, governmental, civic and private backgrounds are brought together (Fig. 4.1). The design charrette is seen as a tool that makes

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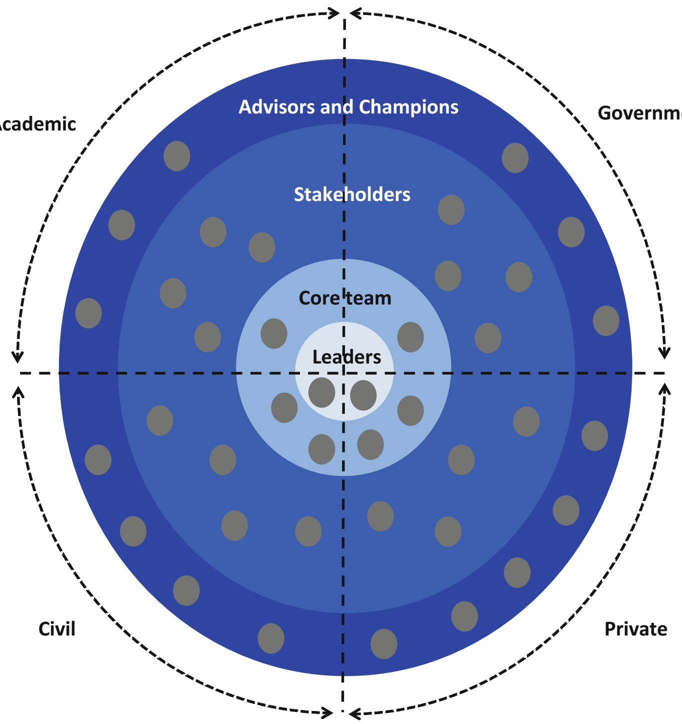


Fig. 4.1 Collaborative team (Adapted from: Suzuki et al. 2009)

an excellent fit for collaborative cooperation for long term future planning: "A charrette is a collaborative approach to design that may offer much more creativity and interdisciplinary thinking than is normal in city planning. At the beginning of the charrette, the teams review and discuss the city's or regions long-term planning framework. During the workshop, the teams engage frequently with invited members of the public and specialists by means of many small presentations and intense discussions and drawing sessions. This broad and meaningful engagement contributes to a positive outcome, with less fear and resistance from stakeholders, and with significant potential for reaching consensus on contentious issues such as the way to apply best practices in the local context" (Suzuki et al. 2009).

In many ways the collaborative approach of design charrettes can be seen as a pivot point in a transition in spatial development processes. Without becoming completely autonomous processes, the design charrettes shape more space for bottom up collaborative processes, in which stakeholders and participants determine, more than before, the agenda and process of the proceedings. This shift in paradigms can be distinguished in five fields of theory building and thinking (Table 4.1): Problem framing, Spatial Planning, Stakeholder Engagement, Mapping and Workshop Tools. For each of these fields the current discourse as well as the shift to design charrette practice will be interpreted.

Table 4.1 Shifting paradigms, initial scheme

Shifting Paradigms In Design Charrettes

Aspect	From		To
Framing			
Spatial Planning			
Stakeholder engagement			
Mapping typology			
Workshop tools			

4.2 Framing Problems

Problems are framed in many different ways. For instance, the issue of climate adaptation in relation to spatial planning has many dimensions (De Boer et al. 2010). From a scientific perspective this problem is framed in at least four different ways (Table 4.2). Framed as a long-term issue, while generating positive ideas about the future (promotional) the objective is to improve the quality of life (social progress frame). When the problem is framed on the long-term, discussing the correctness in terms of right or wrong and operating within a morality frame. The third possible frame is the conflict/strategy frame, in which a battle of groups takes place about the desirable future, short-term and promotional. The scientific uncertainty frame defines the issue around what is known or unknown, aiming to prevent problems on the short term.

Depending the beliefs and preferences different decision strategies can be derived (Table 4.3). A strong belief in cause-effect relations in combination with a preference to be as certain as possible about possible outcomes leads to a computational strategy, in which the best possible decision can be 'calculated'. When cause-effect relations are believed to be certain, but possible outcomes may be uncertain a compromise strategy with participative tools is chosen. A judgmental strategy is used

Table 4.2 Science-related frames

Perceptual distance	Goal orientation and focus	
	Promotion orientation	Prevention orientation
Distal view (long-term, broad categories)	**Social progress frame: Defines the issue as improving quality of life or harmony with nature. Example: Plan to reconcile adaptation and mitigation**	Morality/ethics frame: Defines the issue in terms of right or wrong; respecting or crossing limits. Example: Al Gore's movie: An inconvenient truth
Proximal view (short-term, narrow categories	Conflict/strategy frame: Defines the issue as a game among elites, a battle of personalities or groups. Example: climate proof city	Scientific uncertainty frame: Defines the issue as a matter of what is known versus unknown. Example: sea level discussion

Based on De Boer et al. (2010); and adapted from Nisbet (2009)
Most applicable frame for design charrettes in red

Table 4.3 Different decision strategies

Beliefs about cause/effect relations	**Preferences regarding possible outcomes**	
	Certain	**Uncertain**
Certain	Computational strategy (causation and outcome preferences are certain, data are voluminous). Methods and tools: * Cost-benefit analysis tools * Multi-criteria analysis tools	Compromise strategy (uncertain due to opposing preferences or external constraints). Methods and tools: * Participative tools, e.g. stakeholder analysis and focus groups
	* Accounting tools and physical analysis tools	* Argumentation support tools * Negotiation tools
Uncertain	Judgmental strategy (uncertain due to incomplete knowledge, inherent uncertainty or competition with rival decision-makers). Methods and tools: * Scenario analysis tools, expert panels, simulation gaming * Model tools (biophysical, socio-economic, integrated) * Checklists for judging model quality and uncertainties	**Inspirational strategy (uncertain due to a combination of reasons from the upper right cell and the lower left cell). Methods and tools: *Cognitive aids, e.g. checklists for prompting new ideas, "rich picture" drawing *Development of learning-scenarios**

De Boer et al. (2010); modified and adapted from Thompson (2003)
Most applicable frame for design charrettes in red

when cause-effect relations are seen as uncertain, but outcomes are preferably certain. Finally, an inspirational strategy, in which new ideas and learning are central, is applied when cause-effect and possible outcomes may be uncertain. Each decision strategy requires typical tools.

When scientific framing is coupled with possible decision strategies, different action perspectives arise. A design charrette, focusing on the long-term, generating new ideas and operating as a learning process, couples the social progress science frame with an inspirational decision strategy. Its objective is to generate positive, promotional ideas about the long-term future and offers space to discuss the certainty of the cause-effect relation and creates an atmosphere in which possible outcomes can be freely explored.

4.3 Dealing with Change

How we deal with change is often an underlying question that isn't always addressed through policy and planning processes. If we, a community, are confronted with more complexity and more change, as societies under threat of climate change currently are, this leads to more variety in the way we experience our environment (Wierdsma 1999). A way of reacting in such circumstances is, instead of returning to wellknown procedures 'of the same' kind, to introduce more variety and cherish diversity as a collective competence. When people are encouraged to allow for diversity in values, opinions and visions, this collective competence will dynamically emerge. It is learning by working and working by learning at the same time. This 'co-creation of change' (Wierdsma 1999) can be experienced in optimal form in design charrettes. In the charrette context a variety of people are brought together, maintaining their diversity in professional expertise as well as in their own values and visions. In a well-organised and directed process all individual competences will emerge into a collective one, crystallised by the collective drive to design the desired future. The following principles for dealing with complexity and change are distinguished (after Wierdsma 1999), which can be read as predefined conditions for a successful design charrette:

1. Revaluation of context specific knowledge of experience (local storytelling);
2. Learn to act without disappearance of existing pluralism and diversity;
3. Organise for transactions (as the opposite of organise for positions). Order activities, focus on the contributions (of participants) and facilitate dealing with variety: balancing between stability and dynamic enhancing activities;
4. Self-organisation of units or teams and respect for their autonomy;
5. Create platforms for interactive processes;
6. Value the unidentified character of interactive processes and meaning creation;
7. Allow participants to construct, in interaction with each other, meaning creation and give reality significance;

8. The place where the result of ordering (e.g. minimising variety) appears is called the *place of effort* (Kooistra 1988). Here, the entrance of participants to the process of creating meaning is blocked;
9. Processes of co-creation need to be accessible for all participants;
10. The process needs to be open and indeterminate, which can be organised through temporary workable arrangements. In the design charrette a variety of exercise types may provide this as 'specific conversation spaces'.

4.4 Charrettes in the Spatial Planning Discourse

Spatial planning is defined in many different ways. Dror (1973) describes planning as a process: "Planning is the process of preparing a set of decisions for action in the future, directed at achieving goals by preferable means". It is the 'co-ordination, making and mediation of space' (Gunder and Hillier 2009). The role of a design charrette is not in every planning system possible. However, in recent planning theory literature sparse, but strong signals can be found illuminating a change in planning paradigm. Scholars such as Newman, Boelens, Miraftab, Davy and Gunder all, from different angles, point at (the need for) planning 'moving away' from its traditional, and often one dimensional, organisational base: the government. Planning paradigms, such as positivism, incrementalism, post-positivism, agonism and reflexive planning are all to a certain extent, but mostly inextricably connected to governmental agencies. Each of the different planning theories is first briefly characterised, before the potential use of design charrettes is linked to the suitable squadron.

Positivist planning schools, such as comprehensive rationality or a systems theory approach, look for general laws, are science based and top down organised (Allmendinger 2002b). To start planning all characteristics need to be known (McLoughlin 1969) and this requires much data, which is, for many organisations, hard to achieve (Banfield 1973), especially when problems are complex. Serious simplification of the problem is necessary (Lindblom 1959).

Incrementalism, is "the science of muddling through" (Lindblom 1959). It considers planning as a continuous step-by-step process, which is adequate when present policies are satisfactory and problems and means are continuous (Dror 1964). Instead of taking *next best* steps, incrementalism reflects repetition of decisions of those in power, effectively a *status quo* (Cates 1979), which is especially non-productive when the environment presents itself as a non-incremental change.

Post-positivism (Allmendinger 2002a) focuses on subjective knowledge and endless possibilities for description (Allmendinger 2002b), it rejects 'master narratives' and 'foundational claims that purport to be based on science, objectivity, neutrality' (Farmer 1993: 392, cited in: Hillier and Cao 2011). Collaborative planning (Healey 1997; Innes 2004; Innes and Booher 1999, 2004) or communicative rationality (Habermas 1987, 1993), post-modernism (Beauregard 1996; Jencks 1987; Allmendinger 2001) and communicative planning (Forester 1989), call stakeholders to '…take a major leap in reflexive activity, to stand back from their particular concerns, to review their situation, to re-think problems and challenges, to work out opportunities and constraints, to think through courses of action which might be better than current practices and to commit themselves to changing things' (Healey 2006: 244). It is oriented on structuring processes, stakeholder involvement and aiming for consensus. Collaborative planning theory imagines a level playing field where differences in power and wealth are somehow counteracted, but it often functions in an ideological way to legitimize an already assumed economic consensus (Newman 2011) re-emphasising existing power relations.

Agonism (Mouffe 1993, 1999, 2000, 2005; Hillier 2003; Pløger 2004) acknowledges and respects permanent conflicts in political communication. In the political realm of agonism, compromises and consensus are possible, but "should be seen as temporary" (Mouffe 1999: 755). "Agonistic confrontation is in fact [democracy's] very condition of existence" (Mouffe 1999: 756), aiming to see the participant one heavily disagrees with or does not understand, as an adversary 'one can learn something from' (Mouffe 2000). The art of 'strife' is essential, allowing for a respectful way of disagreement (Pløger 2004). However, by situating democratic agonistic struggles primarily within the state and its parliamentary institutions, Mouffe leaves the actual political space of the state unchallenged (Newman 2011) and it is unable to conceive of politics outside this framework.

Reflexive modernisation (Beck 1992, 1994; Beck et al. 1994), a social theory, emerges as the known rules of the first modernity are 'in flux' (Beck et al. 2003). The capacity to change (Amin 2004) and learning by monitoring is a matter of developing a strategic and reflexive rationality (Lombardi 1994; Sabel 1994). Reflexive planning aims to engage actors continuously in an "actor-consulting model" (De Roo and Porter 2007: 233). Reflexivity in planning focuses on 'projectivity', creativity and change; always bearing in mind that the future is uncertain, and that ready answers are not easy to come by (Lissandrello and Grin 2011).

Reflexive modernity offers the framework of thought within which the fluidity of relations and interactions in planning processes can be placed and how these processes influence future developments (Healey 2009; Hillier 2007). However, planning needs to step away from the widespread code of what is unconsciously accepted 'good planning', positioning the planner as the one 'who knows' (Gunder 2011), meanwhile, creating a "non-innovative state of mono-rationality" (Davy 2008). An alternative looms when the fundamental properties of western planning mono-rationality, '*Playing by the rules*', '*Repeat habitual prior experiences*' and creating a '*non-innovative status quo*' (Davy 2008) are left behind.

'An 'unsafe' planning practice of poly-rationality, where liquid, turbulent or even wild boundaries of both planning thought and spatial territory can occur and establish planning without tightening and dictating regulations – literally, to do 'it' without the safety of a condom (Davy 2008)! This is a planning practice that takes risks, accommodates differences and encourages the new and creative.

This could result in post-anarchistic, or autonomous planning, in which self-organising groups and organisations plan their own environments outside the governmental, political arena and create a *disordered order* of spaces that are 'becoming' (Newman 2011). Planning is increasingly seen as an informal, insurgent process, such as in South African slums (Miraftab 2009), which comes from 'outside inward',

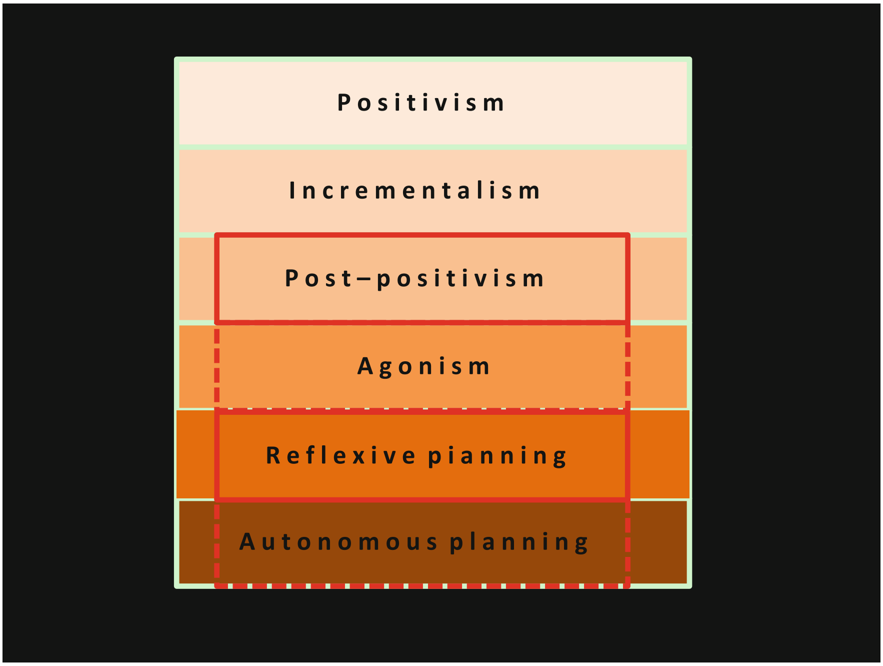
Fig. 4.2 Self-organisation patterns resulting from collaborating occupants at Tahrir-square (http://www.mumbaishianews.com/2011/02/tahrir-square.html)

led by actors external to the normal governmental planning arena (Boelens 2010). This strongly relates to the temporary occupation of the Tahrir-square in Cairo during the uprising early 2011, which became the centre-point of activities, unrest and military intervention. The people gathering on the square were not randomly occupying the space. They deliberately organised themselves by creating all necessary functions on the square (Fig. 4.2) that any society would plan for in a neighbourhood.

"First of all, they took over a nominally public space, which the state wished to exclude them from access to, Tahrir Square. Having taken it over, and affirmed that they wouldn't simply go home at the end of the day – something we might want to think about – they saw off wave after wave of assault on the protests, from police and plain clothes thugs. They set up committees to keep watch for government men… They set up a network of tents for people to sleep in… There are toilet arrangements – no small logistical matter when there are routinely hundreds of thousands of people occupying the capital's main intersection. They rig up street lamps to provide electricity. They set up garbage collection, medical stops – they occupy a well-known fast food outlet and turn it into somewhere that people shot at or beaten by police can get treated. They set up a city within a city, and collectively coped with many more challenges than the average city would have to face in an average day." (Seymour 2011, cited in Newman 2011).

Positioning the design charrette in the planning discourse is not easy, but it relates to several aspects of different planning schools. Long term, stakeholder involvement, informal structures, could be seen as the unstructured processes of anarchistic planning, but without the usual suspect tools, such as meetings, drawings and boardroom

Table 4.4 The most suitable environments for using design charrettes



Most applicable planning discourse for design charrettes in red

decisions. Collaborative and reflexive planning methodologies seem the most obvious to use design charrettes (Table 4.4).

The design charrette does not replace any of the existing planning processes or methods, but it is an additional tool to support complex decision-making or long-term thinking.

4.5 Design Charrettes and Stakeholder Engagement

One of the core aspects of design charrettes is the involvement of many different participants in the design process. Stakeholder engagement is a general term under which several ways of involving relevant people in collaboration processes is captured. Images accompanying these are showing sectors/segments coming together in or starting from the middle (Fig. 4.3) or circles circling around a central circle (Fig. 4.4).

A stakeholder is defined as: ‘any individual or (as representatives of a larger) group who has a (vested) interest in a particular decision, a project or the outcome of a body of work (Department of Immigration and Citizenship 2008; MCMPR

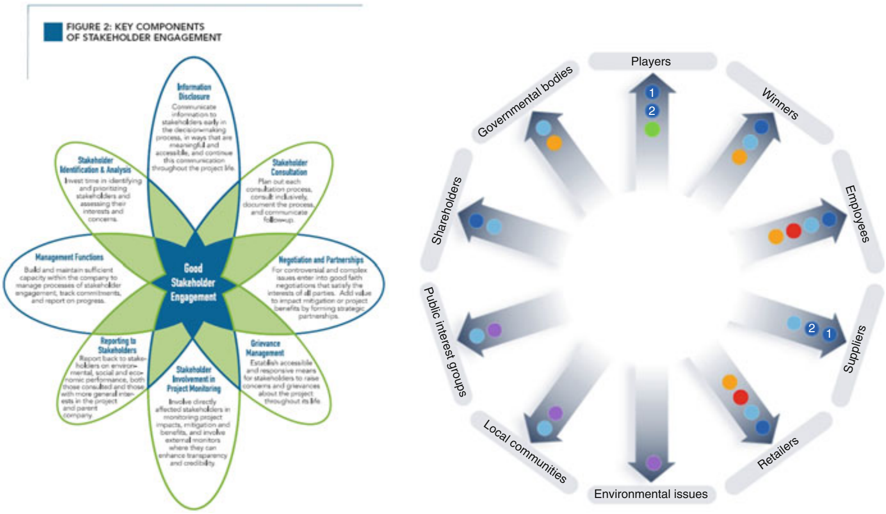


Fig. 4.3 Sectors and segments as part of a center of stakeholder engagement (http://www.griequity.com/review/images/2007/stakeholderengagementUN200707.jpg and http://finntrack.co.uk/images/stakeholder-engagement-dot.gif)

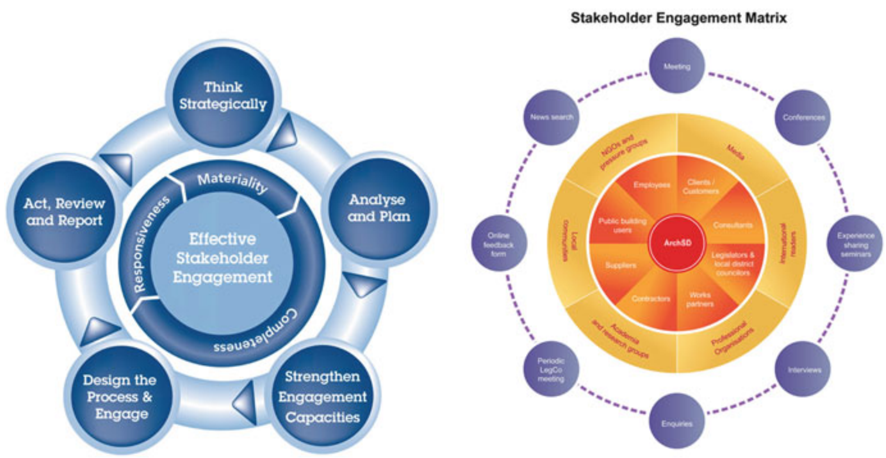


Fig. 4.4 Circles circling around a circle (http://www.landcom.com.au/AnnualReport2010/downloads/uploaded/aboutus/Stakeholder-Graph-V2_0f33.jpg and http://www.archsd.gov.hk/english/reports/sustain_report_2009/en/_images/chart5-large.jpg)

2005; Gray 2006; Gardner et al. 2009). This includes people who influence a decision, or *can* influence it, as well as those affected (or be influenced) by it' (MCMPR 2005; Gray 2006; Gardner et al. 2009). A key stakeholder is defined as having *significant* influence on or being significantly impacted to an extent the work of project

Table 4.5 Levels of engagement (Gray 2006)

Inform	To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or soluons
Consult	To obtain public feedback for decision-makers on analysis, alternaves and/or decisions
Involve	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered in decision making processes
Collaborate	To partner with the public in each aspect of the decision including the development of alternatives and the idenfication of the preferred solution
Empower	To place final decision-making in the hands of the public

is in danger if not recognised (Department of Immigration and Citizenship 2008). Stakeholder engagement describes any process that involves stakeholders in some form of collaborative effort directed towards a decision, which might involve future planning and/or behaviour change. The extent of this collaboration can vary from fairly brief and simple, to more extensive and long-term relationships (Gardner et al. 2009).

The level of engagement (Gray 2006) differ from the low level of providing information to the highest level of giving stakeholders final decision-making power, empowerment (Table 4.5).

The basic principles of stakeholder engagement are strategic and operational (after: AccountAbility 2011; MCMPR 2005). The strategic principles are significance (to stakeholders), completeness (of concerns, views, needs and expectations) and responsiveness coherently and appropriately.

The operational principles are:

- Communication: open and effective communication means listening and talking (two-way communication, clear, accurate and relevant information and timeliness);
- Transparency: clear and agreed information and feedback processes. (transparency and reporting);
- Collaboration: work to seek mutually beneficial outcomes where feasible.

- Inclusiveness: recognise, understand and involve communities and stakeholders early and throughout the process.
- Integrity: conduct engagement in a manner that fosters mutual respect and trust.

Stakeholder engagement processes are identified in many ways. The following components and steps can be part of this process (Based on: Gray 2006; Department of Immigration and Citizenship 2008; Gardner et al. 2009):

1. Definition of the desired outcomes: the overall aims of an engagement process.
2. Purpose, scope and context:
   a. Setting the strategic objectives. Define the reason for a stakeholder engagement process. It is critical, that the persons or organisation(s) responsible for commissioning the stakeholder engagement process share a common purpose;
   b. Scoping how much can really change as result of participation. This results in a clear statement about what the engagement exercise can change (the 'promise to the public'). It is also important about the level of participation (see Fig. 5.6). Finally, scoping the accepted level of risk. To reach something new, something not already known is why the engagement process is started in the first place. But what are the limits?
   c. Determining the context. The context is determined by a broad spectrum of factors:
      (1) Decision-making environment: identify key stakeholders and significant issues, the interest, commitment and involvement of key decision-makers, legal and policy parameters and the fit in relevant policy systems;
      (2) Past participatory exercises on the same project/program/area, including the final outcomes;
      (3) Share information with coinciding activities to prevent duplication or oversight and dovetail potential outputs;
      (4) Characteristics and capabilities of participants. Identify the unlikely participants, such as from disadvantaged neighbourhoods, the existing antagonism or political alliances between key participants, the (cultural) diversity of participation experience and any barrier to people working together. Strengthen the ability to respond to an issue and enhance stakeholder's capacity to engage.
3. Design the planning framework for the process. Identify the most effective engagement approach: program, timing, numbers, costs, techniques, use of results etc. As part of the design use group discussion, which allow for mutual influence and use varied presentation formats,
4. Cater for engagement in the process: the unpredictable is inevitable. Enable a process to adapt to new and unforeseen circumstances through an iterative and flexible approach and respond to the unpredictable. During the process, foster trust, respect and ownership;

5. Conduct a final evaluation: are desired outcomes and originally agreed purpose achieved, are demands of participants met, are follow-up activities, is learning ensured and are stakeholders assured? After the process, maintain contact and stay open to feedback.

Many of the described processes have a cyclic character. Step one is followed by two, three and so on. However, in a strong engagement process these steps overlap, mix and occur as parallel activities at the same time. For instance evaluation is a continuum, which starts at the beginning and identification of stakeholders continues even if the planning process is close to an end.

A well-organised stakeholder engagement process involves participants as early as possible.

The benefits of are many (Gray 2006; MCMPR 2005):

- Strengthening of democracy by encouraging more active involvement by communities and other stakeholders
- Improvement in the quality and sustainability of public and private-sector services
- Building greater community cohesion
- Tackling complex problems in public sector service design and delivery
- “Added value” and greater sustainability for related projects and agendas
- Better co-ordinated consultations
- Establishing a clear audit trail of engagement to support the project
- There is a higher risk of project failure if engagement is not done
- Reduced risk of social conflict and associated delays and costs
- Ensuring compliance with the relevant legislative framework
- Quicker and smoother permitting and approvals processes
- Reduced risk of criticism and resistance from outside parties

The stakeholder process is not a goal in itself (despite most of the cited literature does), but is a mean to reach a certain objective, which is relevant to a community. Design charrette sees engagement as a mean: it involves people not because the stakeholder engagement project is the goal and therefore people need to be ‘engaged’, but people are involved because they are important thinkers and collaborators to identify the best possible future for themselves. Engagement is not an aim, but the result.

4.6 Participatory Mapping

Design charrettes make abundant use of map-making exercises. In many contexts and places around the World, maps are seen as a tool to express existing or future qualities and desires at a community level. It is an excellent tool, whether it is GIS supported or not, to use in participatory processes.

The use of maps allows for conveying information through a visual language consisting of items of a legend: symbols (points, lines, polygons, and volumes), their variables (hue, orientation, shading value, shape, size, and texture), and interpretation

Table 4.6 Shift from things to people (Chambers 1994)

Point of departure and reference	Thing	People
Mode	Blueprint	Process
Keyword	Planning	Participation
Goals	Preset, closed	Evolving, open
Decision-making	Centralised	Decentralised
Analytical assumptions	Reduticonist	Systems, Holistic,
Methods, Rules	Standardised	Diverse
Technology	Universal Fixed package (table d'hate)	Local Varied basket (a la carte)
Professionals' interacons with clients	Motivating	Interacting
Client seen as	Controlling beneficiaries	Empowering actors, partners
Force flow	Supply-push	Demand-pull
Outputs	Uniform Infrastructure	Diverse Capabilities
Planning and action	Top-down	Bottom-up

keys. The "talkative" capacity of maps rests in the selection of featured items (what), in the manner these are depicted (how), and in the capability of users to understand, interpret, and relate these to their real worlds (who) (Rambaldi 2005).

Participation implies a shift from Things to People (Chambers 1994) (Table 4.6), because a thing cannot really participate as a person can. Here, the, often standardised, way of making a map needs to be combined with peoples capacities, which are often not standardised, evolving, locally different and diverse.

Participatory mapping is a map-making process that attempts to make visible the association between land and local communities by using the commonly recognised language of cartography (IFAD 2009). Participatory maps often differ from mainstream maps in the sense that they represent a social and cultural view of the landscape other than the view of the dominant sectors in society. It offers groups the possibility to express themselves apart from existing power structures. Mapping exercises enable communities to (IFAD 2009):

- Articulate and communicate spatial knowledge to external agencies
- Record and archive local knowledge
- Undertake land-use planning and resource management
- Advocate for change
- Increase capacity; building community cohesion (Alcorn 2000)
- Address resource-related conflict

Here, four core types of participatory mapping are discussed. In order of increasing (technological) complexity: Hands-on mapping, Scale mapping, Participatory 3D Modelling (P3DM) and Participatory (or: Public Participation) GIS (P-GIS/PPGIS) (Selected and Adapted from Rambaldi et al. 2005, 2006 and Corbett and Keller 2005).

4.6.1 Hands-On Mapping

This is an elementary way of mapping in which local memories are drawn on the ground (ephemeral mapping) or on paper (sketch-mapping). This way of mapping is not accurate and not to scale, but it represents the main features and qualities in an area. When a map is made on the ground (e.g. in the sand or soil), the product is not replicable and it cannot be transported. Sketch mapping is not geo-referenced. Because of the basic techniques used these maps are easy to understand, but they may lack credibility (Fox et al. 2006). This way of creating maps is the most easy to use: everyone with a piece of ground or paper and a stick can do it.

4.6.2 Scale Mapping

This way of mapping uses scale maps as a basis to draw local knowledge on. This gives accurate information on the features and qualities of the area and these can be related to existing landmarks, such as rivers, mountains, roads, and so forth. It makes it possible to derive an accurate spatial representation of reality in which information about directions and distances can be captured. The output can be exported and digitalised into GIS. The scaled maps are little more complex to use, as they require understanding of the maps properties, such as scale, orientation, etc. Despite availability is spreading, accurate scale maps are often not available, especially in developing countries.

4.6.3 3D Modelling

Participatory 3-D Modeling (P3DM) is a mapping tool that combines indigenous spatial knowledge with topographical and geophysical information (land elevation and sea-depth) to produce a scaled elevation model. A typical P3DM process is carried out over multiple days in a workshop-fashion, amongst a group of representative participants from the indigenous community and external facilitators. Using enlarged topographic maps of the local area, participants construct the model by superimposing layers of corrugated cardboard – each traced from a single topographic contour line – and demarcating the model with relevant spatial features stored in the community psyche (Batts 2012). It supports collaborative processes and aims to facilitate participation in spatial problem analysis and decision-making. The scale relief models have proved to be user-friendly, are relatively accurate data storage and analysis devices and at the same time excellent communication media. The difference between an ordinary contour map and a 3D relief model is the vertical dimension. This provides important cues to stimulate memory and facilitates the establishment of spatial associations (Rambaldi and Callosa-Tarr 2002). Pushpins, coloured strings and paint are used to represent the features of the landscape and the local community. The third dimension caters for the modelling to be carried out as a series of overlapping layers of information (e.g. rudimentary GIS), which makes it possible to use the output in GIS.

The construction of a three-dimensional model from a two-dimensional topographic map is both a labour and time-intensive endeavour, but in this time participants engage together in a critical space of collective learning and knowledge-exchange. Older generations may share stories with younger generations. Men and women discuss and compare their distinct relationships with the land, and critical environmental concerns and vulnerabilities are allowed to freely emerge (Rambaldi and Callosa-Tarr 2000). It would be incorrect to assume that the cognitive spatial perspectives of each individual participant are identical, and sometimes this process may lead to disagreement and require compromise amongst participants, which in itself is a vehicle for indigenous spatial knowledge verification. By engaging participants in a space of hands-on discovery learning (Rambaldi 2010), P3DM further lends itself to enhanced community collaboration and participation in decision-making.

As the main benefits the following are seen (Batts 2012):

1. Enhanced visual recognition of important spatial features and boundaries;
2. Improved understanding of ecological complexities, vulnerabilities and the consequences of human behaviour on the landscape;
3. Community cohesion and collaboration; a collective space of knowledge-sharing;
4. Increased self-esteem and motivation amongst stakeholders to participate in development interventions;
5. Effective communication of indigenous knowledge, development needs, and planning strategies to other agencies.

4.6.4 (P)PGIS

Participatory GIS (PGIS) integrates local knowledge and qualitative spatial and non-spatial data into GIS to support discussion and decision-making processes in the community. P-GIS or Public Participation GIS (PPGIS) (Obermeyer 1998; Quan et al. 2001) makes use of the means of a ‘visual language’ (Schlossberg and Shufford 2005), which facilitates the representation of different, conflicting and competing expressions of place (Weiner et al. 2001; Warren 2004; Kyem 2004), the negotiation of the meaning of data and accuracy (Weiner et al. 2001; Warren 2004) and the means to support the process of collaboration, communication and knowledge transfer deemed at different scales of analysis (Sedogo and Groten 2002; Kyem 2004). Spatial Information Technologies are able to transform the discourse about land and resources, the meaning of geographical knowledge, the work practices of mapping and legal professionals, and ultimately the very meaning of space itself (Fox et al. 2005).

GIS is capable of analysing and producing very precise information, but maps and GIS can't be very precise about indistinct descriptive spatial terms like 'near', 'far', 'isolated', 'crowded' (Rundstrom 1995). 'Real space', as perceived by people has fuzzy boundaries and flows not well expressed in GIS. The spatial reality is not precise: it is always fuzzy and frequently ambiguous, so it can be misleading to misrepresent it as being precise and accurate – this is 'false precision' (McCall 2006). Moreover, most of the development activities, especially in rural settings, do not need a high degree of spatial exactitude. They are concerned with interventions at the level of communities or ecological zones, which are relatively large spatial entities, and may not have precise boundaries (McCall 2003) after all. As John Maynard Keynes once said: "it is better to be roughly right than to be precisely wrong". A strong capability of GIS is layering. Multiple perspectives always demand multi-mappings, and it is arguable that GIS can represent a holistic, non-reductionist, *weltanschauung* of indigenous/local people. The thematic layers easily created in GIS mapping can reflect the social or environmental images from different groups. Thus, layering has a fundamental relationship with respect for rights and equity (McCall 2003).

It is a valid tool to use for advocacy, because of the sophisticated looks, which gives the outcomes a sense of authority. However, it requires sophisticated capabilities to use GIS. It has a steep learning curve, software needs to be updated regularly, it is expensive, users need to be trained, is time consuming and may give a false sense of legitimacy due to its advanced products. Finally, the focus on the technology may overtake participation. Therefore, P-GIS needs preferably to be framed and used as a participation tool for mediation in educational and motivational sense (Kyem 2006). The tool and process should be owned and demanded by local people and communities and only be facilitated by technical experts (McCall 2004). The question remains however: Who is empowered and who is disempowered (Chambers 2006)?

In terms of benefits, participation and (P)PGIS have been deemed important in conflict resolution, building consensus and producing an informed process (Feick and Hall 2001; Kyem 2004; Warren 2004) and the social interaction taking place in P-GIS processes builds collaborative institutions (Kyem 2004). This all reflects value added to society, which in turn can potentially enhance social and human capitals (e.g., building trust and kinship) and improves the adaptive capacity (i.e., building capacity) of a system (e.g., a community or a social group) (Beierle and Cayford 2002; Schlossberg and Shufford 2005). To interpret, discuss and reflect on community vulnerabilities by enabling and opening a dialogue (Patiño and Gauthier 2009).

Table 4.7 (Dis-)Advantages of different participatory mapping methods

	Properties	Pro	Con
Hands-on mapping	Local memory put on ground or paper	Easy to use, understandable, represents important local features	Results are not replicable or moveable, lacks credibility
Scale mapping	On scale map used tom draw local knowledge	Accurate direction and distance, related to landmarks, transferable to GIS	Availability of scale maps, requires understanding of map properties
P3D-modelling	3D model made of layered cardboard in relief model, pins, strings and paint	On-scale & accurate, intuitiveand understandable	Accessability to pographic maps, labour intensive, time consuming, storage and transport difficult
PGIS	Representing informaon in layered maps precisely	Advocacy, looks, allows for (many) different viewpoints, collaborative	(Too) precise, advanced capabilities required, costly

Participatory mapping methods can be applied in many different circumstances, places and projects. When the most suitable method to use in design charrettes must be chosen, scale-mapping and 3D modelling are the most likely (Table 4.7), because they are relatively accurate and easy to use and understand. In a design charrette setting the method requires understanding by everyone and time or money lost to the method instead of making use of it is less productive.

In general, any participatory process as such does not require extreme accuracy or high-tech tools and equipment. Especially in developing countries, where abundant resources are often not available, this may simply be not possible. Even in well-resourced and -developed countries the question might be asked whether it is desirable to have the most advanced means to conduct a participatory mapping exercise. In particular, long-term visioning processes do have no need for detailed and extremely accurate mapping tools and methods. It is often satisfactory to have access to accurate paper (topography, geophysical) maps and to have the ability to build 3D-models (with material to build them). This may be different for detailed resource management or nature conservation plans, for which accurate analysis of existing ecological values and resources is required. Design charrettes, mainly focusing on the long-term local and regional visions can be easily conducted without costly and time-consuming data.

4.7 Workshop Methods

Design charrettes can be counted, due to their positively framed nature, to the theory of Appreciative Inquiry (Srivastva and Cooperrider 1999; Cooperrider and Whitney 2005; Cooperrider et al. 2008). The theory of Appreciative Inquiry advocated what is applied in a design charrette:

1. Starting point is to look for and make use of the strengths of the individuals and the group (Discover what works well, Appreciating);
2. Create common images of a desired future (Dream what would work well in the future, Envisioning);
3. Use of the four ‘powers’ on which the methodology is build: look for success, imagine a commonly desired future, use participants language and storytelling;
4. Translate images into desired processes, plan and prioritise (Design what would work well, Engaging);
5. Translate the desired future into concrete action, implement (Destiny of what would work well, Innovating).

The core of the approach is to start looking at what works well and how could it function even better, instead of why something operates not good. This attitude of seeking for a positive future is applicable in design charrettes, in which it is necessary to look to the future with a positive mind-set. Problem oriented approaches doe not lead to productive and creative new insights about how the future is desired. Within design charrettes several positively framed techniques are applied: brainstorming, back-casting and backtracking.

4.7.1 Brainstorming

Brainstorming is a group or individual creativity technique by which efforts are made to find a conclusion for a specific problem by gathering a list of ideas spontaneously contributed by its members (Osborn 1963). Osborn found two principles to contribute to ideative efficacy: Defer judgment and Reach for quantity. Following these principles four general rules of brainstorming, established to reduce social inhibitions among group members, stimulate idea generation, and increase overall creativity of the group, are defined:

Focus on quantity: This rule aims to enhance divergent production and to facilitate problem solving through the idea that *quantity breeds quality*. The assumption is that when more ideas are generated, the greater the chance radical and effective solutions arise.

Withhold criticism: In brainstorming, criticism of ideas generated should be put 'on hold'. Instead, participants should extend or add to ideas and reserve criticism for later. When judgment is suspended, participants feel free to generate unusual ideas.

Welcome unusual ideas: To get a good and long list of ideas, unusual ideas are welcomed. Unusual ideas are sparked when the problem is looked at from a new perspective and when assumptions are suspended. New ways of thinking provide new solutions.

Combine and improve ideas: Good ideas may be combined to form a single better good idea, as suggested by the slogan "1 + 1 = 3". A process of association stimulates the building of new ideas.

For a long time, these general rules were all too logical to be challenged. And still, in many practical brainstorming sessions these are presented as the golden rules of brainstorming, become creative and developing ideas. However, later research stipulates that interactive brainstorming in groups leads to a loss of productivity (Mullen et al. 1991), because less ideas are produced in the group process than when brainstorming individually (Diehl and Stroebe 1987). Group participation using brainstorming even inhibit creative thinking (Taylor et al. 1958). It is claimed that people perceive a high productivity while group brainstorming (Pauhus et al. 1993). As the quantitative research shows this is not the case, but brainstorming in groups remains still very popular. People think they contribute more than they do and people think they have more ideas than they do when in a brainstorming session and people think they had more ideas after taking part in brainstorming than they actually do.

Excluding participants' interactions through applying electronic brainstorming shows that the productivity increases in groups of four participants and up (Brent Gallupe et al. 1992). Even stronger: the bigger the group (research done up to 12) the higher the productivity of ideas. This is underpinned except for nominal brainstorming (brainstorming alone), which has a similar productivity as electronic brainstorming in groups (Pinsonneault et al. 1999). As group size matter to productivity, the process structuring makes also a difference. When the question is presented as one overarching big question and put in the brainstorming session productivity is lower than in case the questions is presented in smaller sequencing pieces (Dennis et al. 1996). The latter is for example practiced in the Groningen *Enervarium* (http://www.enervarium.nl) located on the top floor of the Graansilo (Figs. 4.5 and 4.6).

Results are surprising, not only to the participants of the electronic brainstorming sessions, but also for facilitators and the commissioners of the session. The big question is sliced down to approximately 5–6 'minor' questions, which in sequence are discussed invisibly by a maximum of 12 participants using laptops. Each of the sub-sessions delivers an abundance of ideas and electronic interactions, which are all visible real time on the screens. This alone leads to generation of more new ideas. Some of the sessions create stories by switching participants after 30 s, allowing further association on the story that is created by your predecessor(s). The main directions, ideas and stories are filtered by the facilitator(s) and feed into next questions, which is subject of the next brainstorming sessions. All material and ideas are captured and grouped afterwards. This means that not a single idea is lost. The spread of ideas can be brought back to a limited number of themes, which can form the core of a governmental policy, such as for the ecological future policy of the province of Groningen (AdfoMovere 2007), a marketing strategy for a big company or an advertising campaign for an NGO, or any other purpose a client desires.

Fig. 4.5 The Groningen Enervarium from the inside (https://fbcdn-sphotos-b-a.akamaihd.net/hphotos-ak-snc7/305877_187044004713963_1908055345_n.jpg)

Fig. 4.6 The ‘Graansilo’ in the eastern city centre of Groningen (http://mw2.google.com/mw-panoramio/photos/medium/1950463.jpg)

4.7.2 Back-Casting

The major distinguishing characteristic of back-casting analysis is a concern, not with what futures are likely to happen, but with how desirable futures can be attained. It is thus explicitly normative, involving working backwards from a particular desirable future end-point to the present in order to determine the physical feasibility of that future and what policy measures would be required to reach that point (Robinson 1990). The method seems to have been first employed in energy futures studies (Robinson 1982).

Typically back-casting is applied on long-term complex issues, involving many aspects of society as well as technological innovations and change. The focus of interest is on a perceived societal problem of great importance such as the vast and growing impacts of transports on the environment (Dreborg 1996). For the following types of problems a back-casting approach is suitable (Dreborg, after Steen and Åkerman 1994):

- When the problem to be studied is complex, affecting many sectors and levels of society;
- When there is a need for major change, i.e. when marginal changes within the prevailing order will not be sufficient;
- When dominant trends are part of the problem-these trends are often the cornerstones of forecasts;
- When the problem to a great extent is a matter of externalities, which the market cannot treat satisfactorily;
- When the time horizon is long enough to allow considerable scope for deliberate choice.

Compared with forecasting (Table 4.8) back-casting focuses on identifying desirable and interesting futures that are able to solve a pressing human, societal problem. According to Dreborg (1996), the merits of back-casting should to a large extent be judged in the context of discovery rather than in the context of justification. It is an approach, which may promote creativity, by shifting the focus from present conditions to a situation sufficiently far off in the future to permit radical change (De Bono 1983).

The result of a back-casting process is (several) alternative images of the future, which may serve to support strategic choices for society and are meant to provide input to a policy-forming process in which with many actors are active. Each future image needs to be a well worked out example of what a sustainable future may be like, with the aim of widening perceptions of possible solutions among various actors. The alternatives must highlight consequences of strategic choices in society. The future images do not form the basis for a single big decision nor is it a plan or a blueprint. Here, it separates itself from forward mapping (Elmore 1980), which begins with an objective, it elaborates an increasingly specific set of steps for achieving that objective, and it states an outcome against which success or failure can be measured. In the back-casting process the contrary is more suitable: backward mapping questions the assumption that explicit policy directives, and well-defined outcomes will increase the likelihood successfully. Backward mapping starts at the

Table 4.8 Forecasting and back-casting in comparison

	Forecasting	Back-casting
Philosophical view	Causality, determinism, context of justification	Causality and teleology, partial indeterminacy, =+ context of discovery
Perspective	Dominant trends, likely futures, possible marginal adjustments, how to adapt to trends	Societal problem in need of solution, desirable futures, scope for human choice, strategic decisions, retain freedom of action
Approach	Extrapolate trends into the future, sensitivity analysis	Define interesting futures, analyse consequences and conditions for these futures to materialise
Methods	Various econometric models	Partial and conditional extrapolations highlighting interesting polarities and technological limits
Techniques	Various mathematical algorithms	-

After: Dreborg (1996)

last possible stage of the planning process identifying the specific properties of the future, generating an objective only after the future properties become clear. After the relatively precise future target is set, the follow up questions are how to reach this and what resources are needed. Finally, resources are directed, to where the greatest effect can be reached (Elmore 1980). However, there is no single method that suits getting novel ideas, as this is a non-logical process. It is possible to get a brilliant idea without using any specific method. It is the result that counts. However, because broad fields of knowledge are involved in identifying alternative images for the future, a multidisciplinary team is required.

Back-casting is not a technical exercise, but, when multiple stakeholders are involved (Quist and Vergragt 2006; Carlsson-Kanyama et al. 2003) or stakeholder participation is combined with advanced computational modelling (Van Berkel and Verburg 2012) it is also a process in which higher order learning occurs (Quist and Vergragt 2006). The social interaction between actors and negotiations can lead to learning processes not only on the cognitive level, but also with respect to values, attitudes and underlying convictions. The latter is also known as 'higher order learning' for which several conceptualisations have been made (Brown et al. 2003). In policy oriented learning, for instance, it involves redefining policy goals and adjusting problem definition and strategies, while in organisational learning it involves changes in norms, values, goals and operating procedures governing the decision-making process and actions of organisations. This is of great importance in case of complex problems with actors with different mental frameworks or action theories (Grin et al. 1997). The assumption here is that higher-order learning leads to changes in the mind-sets or frameworks and thus broadens the space for actions and behavioural alternatives (Quist and Vergragt 2006).

In the project Aandacht voor Veiligheid (Attention to Safety), which is part of the Climate Changes Spatial Planning Program (www.climatechangesspatialplanning.nl) in the Netherlands, intensive back-casting workshop with involvement of stakeholders were organised to develop models for a 'climate-proof[1]' future under different, but also extreme climate change scenarios (Van de Kerkhof et al. 2002, 2007). The modelling, which was taken at hand by making combined colourful paint and drawing sketches (Fig. 4.7) showed visionary images of a future of the Netherlands, but also proved an increased involvement and learning of the participants.

A similar exercise was executed in the province of Groningen, where plasticine was used to develop 3D models of a climate proof future (Van 't Klooster et al. 2008). This exercise, part of the Hotspot Climate Proof Groningen (see Chap. 8), (www.klimaatbestendiggroningen.nl), resulted in two models. Gul Groningen (Generous Groningen) emphasised the long term provision of locally produced food, availability of clean water and harvesting energy from renewable resources, in order to be able to keep the quality of living at the same high standards, while becoming less dependent on external supply. Natuurlijke ophoging achter de dijk (natural heightening behind the dike), provided the solution for possible future floods through proposing an increased ground-level of the landscape as result of a natural process of sedimentation of sand and clay particles, brought to the landscape by controlled intruding sea-water.

Again, this back-casting exercise, involving multiple stakeholders (Fig. 4.8) did not only produce proposals for future images of the area, but the participation in the sessions changed attitudes and opinions of the participants. Many years after the executed process, people still remember the change in their opinions and behaviour. Or as one of the stakeholders once mentioned: "I couldn't really grasp what it was all about at the time, but it really made me conscious in what a policy bodice, full of standards and procedures, we were used to work".

4.7.3 Backtracking

A relatively new phenomenon is backtracking. This technique, originally used in computational science where it is used to identify a general algorithm for finding all (or some) solutions to some computational problem, that incrementally builds candidates to the solutions, and abandons each partial candidate *c* ("backtracks") as soon as it determines that *c* cannot possibly be completed to a valid solution

[1] Climate proof is ill defined in literature. One of the few definitions reads as follows: "climate proofing is the modification of existing and future projects so that they are resilient to impacts from climate change and/or do not contribute to increased vulnerability of the projects goals" (Klein et al. 2007).

Fig. 4.7 Result of future visioning of the Netherlands under extreme climate change (Van de Kerkhof et al. 2002)

Fig. 4.8 Groningen civil servants working on the plasticine modelling (Photo: Rob Roggema)

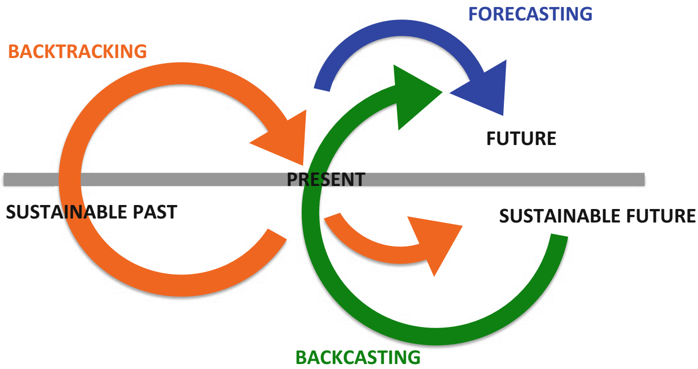


Fig. 4.9 Backtracking, back-casting and forecasting compared

(en.wikipedia.org), means literally: To go back over the course by which one has come (www.thefreedictionary.com). As a technique to be used in planning or future visioning exercises, backtracking has a slightly different meaning. Imagine you're driving on the freeway heading for a holiday but at a certain point you realize that, in order to reach your destination, you've missed an exit. In this case, you need to turn around and drive back to the point where you missed the right exit. Once 'backtracked' to this point you can change direction and head out for the right way. Applied to future visioning for a landscape or an area this technique was first launched in the Scanning the Future sessions of the Grounds for Change design Charrette (Schoot Uiterkamp et al. 2005). In this context a sustainable vision for the future could be derived through backtracking, which was defined as to go back in history when a sustainable equilibrium existed and use these characteristics as inspiration to develop a long-term sustainable vision. The differences between backtracking, back-casting and forecasting (Fig. 4.9) are defined as follows (Van Dam and Noorman 2005):

Forecasting: Present trends are extrapolated. Therefore, forecasting requires a detailed analysis of current relations between many factors that shape the future. Results are depending on assumptions about future trends.

Back-casting: Starts with defining a desired long-term future. Subsequently, scenarios connect present with the desired future and defines the steps to be taken to realise this future. This approach generates insights into the challenges to realise the long-term goal.

Backtracking: focus on a point in history when one could speak of a sustainable equilibrium. This situation is transplanted to the future as a base to define a long-term desired future. Then the scenarios and steps towards this future can be identified. This approach defines the basic values of a region, which nowadays tend to get forgotten, due to a focus on technology and economy. Spatial visions are created on these values in combination with current and future demands.

One example, which made explicitly use of the backtracking technique is the visioning exercise for a long-term water supply in the province of Groningen (Roggema et al. 2008). Two backtracking sessions were organised to develop

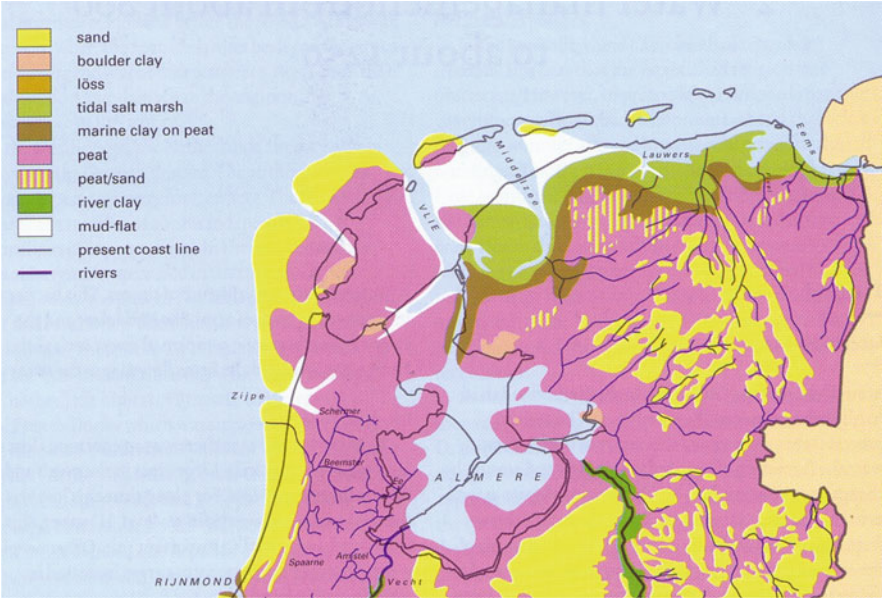


Fig. 4.10 The sustainable equilibrium for climate proof water supply (Roggema et al. 2008)

visions for a water supply, which could continue functioning under future, extreme, climate impacts. The first part consists of defining the historically determined sustainable equilibrium (Fig. 4.10).

The equilibrium was found in 800 BC. This map formed the inspiration for developing future scenarios. The landscape shows a dynamic equilibrium between fresh and salt water, the influence of the sea and the discharge of fresh rainwater. Residential living occurred on artificial hills in the landscape (the so-called *wierden*) and on the Drenthe plateau. Here, water remains stored by means of the existing vegetation or it slowly sinks in the soil. Water was permanently re-used, first in households, to irrigate the fields, before it ultimately flows downwards through small brooks. Translating these values into ingredients for a future fresh water system the following ingredients could play a role:

- Reconstruct the storage capacity on the higher grounds of the plateau;
- A fluent gradient between land and sea, in which economic activities are concentrated, rest-material and –heat can be re-used and energy and water can be re-used and cascaded;
- The concept of Blue Framers (farming with the objective to produce crystal clear water);
- Lauwers Lake as artificial fresh water buffer;
- Capture of discharged rainwater at the foot of the Hondsrug and storage of the clean seepage in a buffer;
- Along the coast saline agriculture;
- Fertilisers from residues

Four different scenarios were subsequently developed, each envisioning a resilient future, not only for the water supply, but often for ecological, economical and living qualities as well. The four models, 'Buffering and Cascading', 'Dam in the Eems', 'Natural Subsistence' and 'Who's afraid of Blue, Green and Red?', illustrate the many different views and ideas emerging from the same historical starting point.

4.8 Conclusion

The different theoretical frames used in this chapter allow for a discussion where a design charrette fits in. When the different positions where a design charrette can be placed in these theories is taken into account (Table 4.9) is becomes clear that the design charrette as such is a melting pot of suitable techniques, tools and methods.

Looking at the table, the design charrette is suited to accommodate certain specific tools, techniques and methods. These are summarised under the following denominators:

- Long-term: the visions for the future are developed for the long-term. This future is decennia away, but the ideas and views are always translated back to the present (backtracking, back-casting) in order to serve for current policy or decision-making;

Table 4.9 Positioning the design charrette (in red) in the spectrum of discussed techniques, tools and methods

	CONSERVATIVE					INNOVATIVE
TOP-DOWN	Positivism					
	Inform	Incremen-talism				
	Consult	Forecasting	Post-positivism		PGIS	
		Involve		Agonism	P3DM	
		Brainstor-ming	Scale Mapping	Back-casting	Reflexive Planning	Backtracking
BOTTOM-UP		Hands-on Mapping	*Collaborate*	*Empower*		Autonomous Planning

Table 4.10 Shifting paradigms

Shifting Paradigms In Design Charrettes

Aspect	From		To
Framing	• Prevention, short-term • Computational		• Promotional, long-term • Inspirational
Spatial Planning	• Positivism • Incrementalism	• Agonism • Autonomous	• Post-positivism • Reflexive
Stakeholder engagement	• Inform • Consult	• Empower	• Involve • Collaborate
Mapping typology	• Hands-on mapping	• PGIS	• Scale mapping • P3D-modelling
Workshop tools	• Forecasting • Brainstorming		• Back-casting • Backtracking

- Open: the processes as well as the results are open. This means that participation is not restricted to a certain group of (established) policy makers or planners and the 'plan' is not a blueprint of how the future must look like (the collaborative/post-positivist and reflexive planning discourse);
- Sustainable: Many of the ambitions to formulate a future vision relate to creating a sustainable future, which gives future generations, worldwide, the same resources and prospects as the current. This is the reason why many tools and techniques specifically pay attention to energy, water, ecology, but because everything's got to do with all, and synergies and trade-offs become increasingly important they become more and more integrated, taking into account population, economic and social justice issues;
- Involving: Many of the tools can be characterised as bottom-up, are inclusive and tend to involve many different stakeholders at the most engaging levels (involving and collaborating);
- Tangible: The process of designing together demands concrete and tangible outcomes. It is not an abstract epistemological exercise, but results can be tested, are practical and can be used for developing concrete development and action plans. Therefore, many of the tools produce tangible products, such as drawings (often very colourful), sketches and 3D-models.

Referring back to the fields of thinking as mentioned before, a shifting paradigm is distinguished for each of the five fields (Table 4.10):

1. Framing the problem (Sect. 4.2).
2. Spatial Planning (Sect. 4.4).
3. Stakeholder engagement (Sect. 4.5).
4. Mapping (Sect. 4.6).
5. Workshop tools (Sect. 4.7).

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4.8.1 Website

http://www.enervarium.nl

Part II
Examples and Case Studies

Chapter 5
INternational Conference on Renewable Energy Approaches for the Spatial Environment (INCREASE)

Rob Roggema and Wim Mallon

5.1 Introduction

INCREASE is an acronym, which stands for: *International Conference on Renewable Energy Approaches for the Spatial Environment*. The idea to convene these conferences originates in 2007 when the Province of Groningen was revising its regional spatial plan. Sustainable development has always been an important issue in consecutive spatial plans and in the process of gathering input for its new plan the province sought thorough contributions in the field of energy and spatial planning. External research has been commissioned to inform the Province of Groningen about the potential contribution renewable energy resources could make to its total energy use. Over the course of this research collaboration with different institutes, such as Energy Valley, Delft University of Technology and Nederlandse Gasunie has been developed. At the same time contacts developed via Energy Valley with MGIMO in Moscow, who offered to participate in a weeklong workshop to provide the knowledge to underpin a renewable energy supply for the region, under the condition that a sweet venue and food would be arranged. The INCREASE idea was born, bringing together experts in the field in a nice location for free of charge thinking in a design workshop. The first INCREASE conference took place in Amman, Jordan in 2008 and the second one in Beijing and Shanghai, China in 2009.

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5.2 The Groningen Region as Example

The province of Groningen is one of the three provinces in the North of the Netherlands part of Energy Valley (www.energyvalley.nl). Energy Valley strives to reach a sustainable energy future, based on the available natural gas resources, infrastructure and knowledge, in combination with economic prosperity. It therefore conducts and assigns research, develops an international network and invests in education. One of the activities is to develop knowledge in the field of implementing renewable energy resources in existing spatial frameworks. Through international exchange, contacts had been developed with MGIMO in Moscow, which is capable of delivering valuable knowledge.

Secondly, the province of Groningen is seen for a long time as a government that is a frontrunner in thinking, researching and implementing innovations in regional planning. Being the first province to have adapted integrality as the basis for its regional planning, it also served as one of the pilot areas in national climate change research (www.climatechangesspatialplanning.nl), amongst others the so-called 'Hotspot Climate Proof Groningen' (Roggema 2009a). The province of Groningen has always been keen to implement the outcomes of these research outputs in its regular spatial planning and other policies.

Moreover, the province of Groningen, together with its colleague provinces in the North, developed the first version of the so-called Energie-akkoord Noord-Nederland in 2007 (SNN 2007), in which the agreements with the National government were laid down about goals to be reached in realizing a renewable energy system in its province. This agreement, which already has been followed up by the second agreement, called a Green Deal for Northern Netherlands (SER-NN 2011).

These factors, and the availability of a variety of data, made the province of Groningen an excellent area to use as the subject of study.

5.3 Objective and Assignment

Current times show strong similarities with the periods just before the energy crises of 1973 and 1979 (Alhaji and Williams 2003). Despite the fact that their article dates back to 2003, the content of their observations is in 2013 still valid. Common elements include:

- Political turmoil in oil producing countries;
- Relatively low oil stocks;
- High import from small number suppliers;
- Declining US petroleum production;
- High dependency on oil imports;
- Low level of oil industry spending;
- Speculation;
- Economic downturn;
- Limited US-policy options for Middle East.

These elements can still be observed in actual international developments. In many daily policy practices and decisions these developments are underestimated and put aside as a future problem. Aims and goals of European, National and Regional policies, such as the EU 20-20-20 ambition (Commission of the European Communities 2008) or the objectives formulated in the Green Deal for North Netherlands (SER-NN 2011), are moving in the right direction. However, the question is if these objectives are ambitious enough and if they will be executed in time. It is known that for a system change to a complete renewable energy provision between 50 and 70 years is required (Roggema et al. 2008). We also know that fossil resources will be depleted in a timeframe of about 30–40 years (Hoogakker 2006), which leaves little time to start transforming the energy system.

This gave reason to start the debate, research and design process of the INCREASE conferences, asking the question what an alternative sustainable energy system comprises, what grid system is required, how does that influence land-use functions and how this zero-fossil landscape might look like. Therefore, the aim of the INCREASE conferences is: "to design a sustainable energy system at the regional scale through formulating, calculating and designing a, entirely carbon free, regional plan for the province of Groningen" (Roggema et al. 2008; Roggema 2009b).

Derived from this broad objective, the assignment for INCREASE is: to design a zero-fossil region for the area of Groningen province for a mid-term future of 30–40 years. The results of the assignments need to be laid down in drawings, references, calculations and explanatory descriptions.

5.4 The INCREASE Methodology

The INCREASE conferences do not belong to the series of regular conference types taking place at a broad scale around the World. INCREASE is by invitation only and a strict number of renowned and established academics in the field of political science, energy, design, innovation and spatial planning from around the Globe are to receive an invitation. Divided over the two conferences up till 2010, participants from Jordan, the Netherlands, Russia, Armenia, Germany, Canada and China have taken part. The experts need to commit themselves to the process in order to get the best results out of the relatively short period of a week. They need to cater for their own airfare and time spent. The host/sponsor will take care of venues, lodging and catering.

Before the conference can be held every participant needs to provide an academic paper in which a vision and research are presented related to the specific theme of the conference. Each of the conferences differed slightly in thematic focus. The first conference demarcated the playing field of discussion while the second conference focused on the spatial implications and design. The papers are reviewed before becoming part of the conference proceedings, which are published before the conference starts.

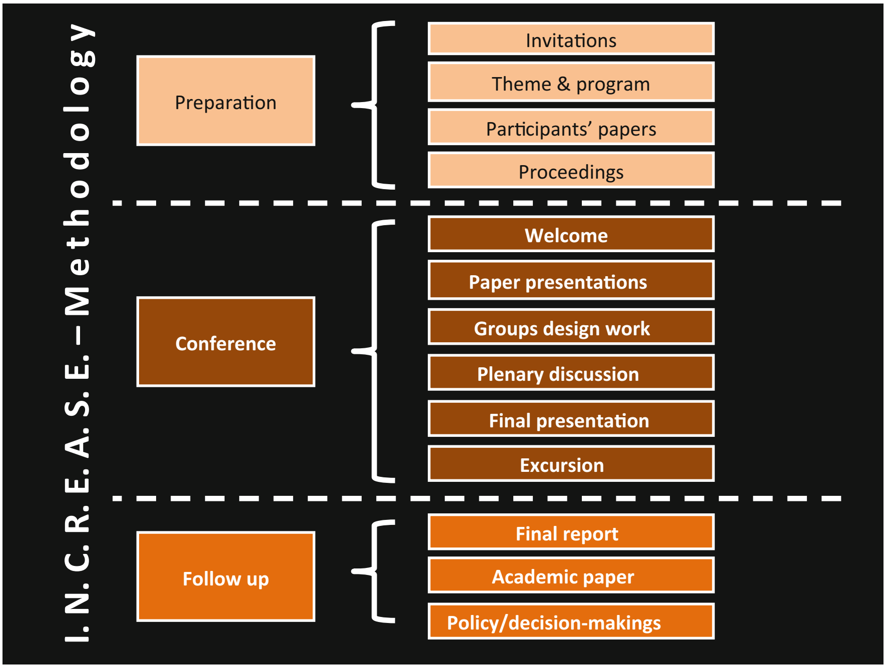

Fig. 5.1 The INCREASE methodology

During the conference, after an official welcome, each paper is presented orally, after which the design and calculation work starts. Discussions take place in groups and in plenary sessions and are punctuated by intermediate presentations about the results. At the end of the conference a plenary presentation for a bigger and important audience resumes the results of the conference. Part of each conference is a cultural heritage excursion.

After the conference, paper presentations, intermediate design work, draft drawings and sketches, and the final power-point presentations are used to draft a final report, in which all results and conclusions are summarised and which each participant can use in their own context. For example, the final reports have been used as the basis for academic journal papers as well as to support political decision-making (Fig. 5.1).

5.5 Hosted in Jordan and China

The first two INCREASE conferences were hosted by the Energy Centre of the University of Jordan in Amman and the University of International Business and Economics in Beijing respectively. Besides the fact that existing networks made contacts easy, these countries are chosen for a sustainable reason as well. Belonging

Fig. 5.2 Final presentation session, Amman (Photo © Desmond de Vries)

to developing countries, the economic and population growth in China poses the country for a serious question how to provide the overwhelming (future) energy demand in a sustainable way. Jordan is a country surrounded by oil producing countries, but doesn't have any fossil resources itself. In order to become less dependent on other countries, the search for renewable resources is evident.

The programs for both conferences are similar, but different. In Amman the program is dominated by public presentations and group work in closed sessions (Fig. 5.3). The conference ended with the final presentations (Fig. 5.2) for a broad and relevant audience, consisting of the president of the University of Jordan, the dean of the Faculty of Engineering and Technology, director of the energy center and president of the developer of a major urban development area in Irbid, and governmental decision-makers of the City of Irbid.

The program in China (Fig. 5.5) started with a welcoming ceremony (Fig. 5.4), followed by paper presentations and design work in teams. Several intermediate presentations about the on-going work preluded the final presentation and the undersigning of the Shanghai declaration, in which the participants of INCREASE II expressed their agreements.

5.6 A Fossil Free Region

The objective to design a fossil free region in the context of the INCREASE conferences means that the region does not use or import any fossil resources. This results in a region with zero carbon emissions.

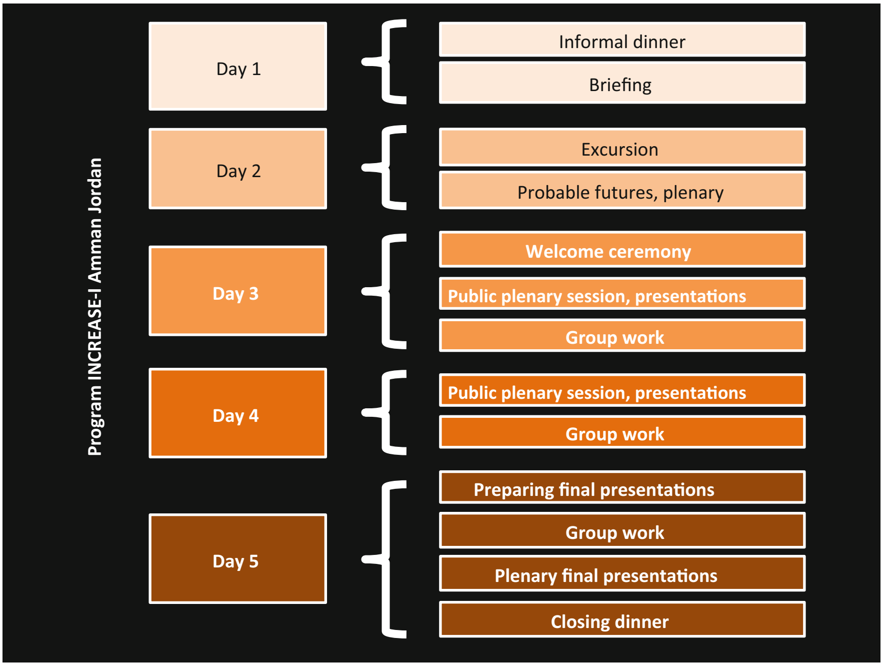

Fig. 5.3 INCREASE program in Amman (After: Province of Groningen et al. 2008)

Fig. 5.4 Images of the opening ceremony in Beijing (Pictures: IUBE-photographer)

5.6.1 Assumptions

The design for a fossil free region is based on several assumptions. The time horizon taken for the design year is 2050. The population is estimated to be stable during this period and it is assumed there will no longer be any heavy industries within its boundaries, but only light industry, such as re- and up-cycling or bio-based processes. The total amount of energy used in the area remains constant. Further, it is

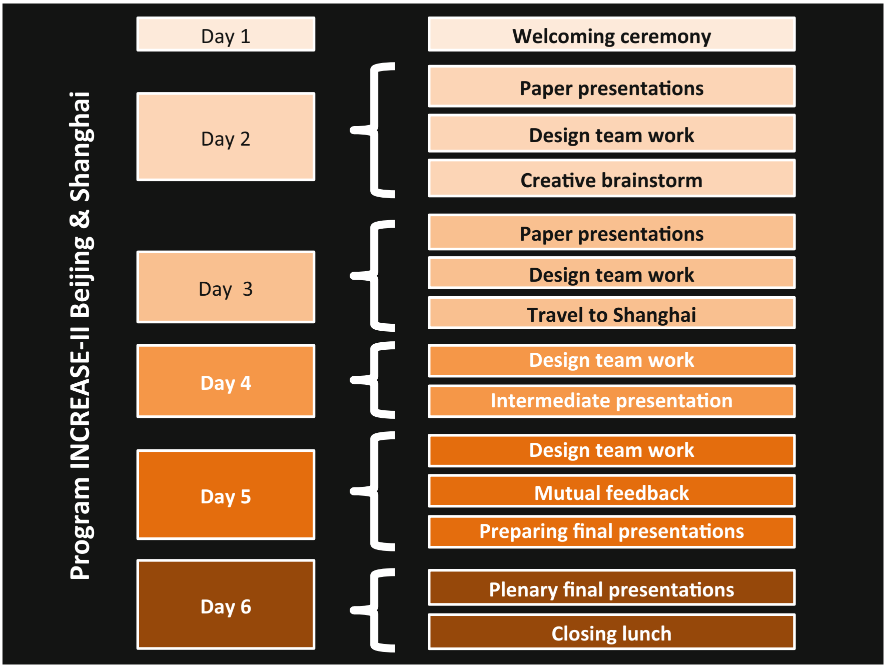

Fig. 5.5 The INCREASE program in Beijing and Shanghai (After: Roggema 2009b)

assumed that in 2050 50 % of current energy use is saved through innovations and other energy saving measures. The other 50 % will then need to be produced with renewable resources in order to become a zero carbon region. Current energy is 182 Peta-Joule (PJ), which means that 91 PJ will need to be supplied using renewable resources. It is obvious this has spatial implications.

5.6.2 Spatial Implications and Design Propositions

In order to meet the goal to supply 91 PJ in 2050 using renewable resources only, a wide variety of spatial measures need to be implemented. Some renewable resources are judged being of higher potential than others.

1. Photovoltaic. This has a high potential in supplying electricity to the region. When 250 km^2 of PV-coated greenhouses are realised, these will produce up to 67 PJ annually. Centralised PV systems are efficient and offer optimal storage possibilities, which implies a minimum of energy getting lost;
2. Wind. Positioning wind turbines along the coast provide another possible 20 PJ of electricity annually;

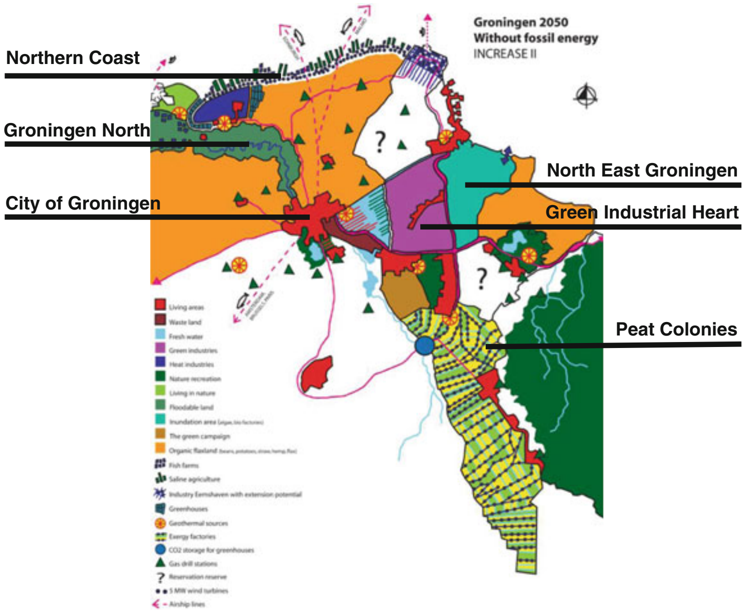

Fig. 5.6 Groningen province redesigned as a province without using fossil resources

3. Geothermal resources can be used to supply heat to households and industries;
4. Algae and brackish water along the coast can be developed as an energy source, supplying up to 2 PJ of energy annually.

The efficiency of these high potential renewables is not similar in every area. Some areas have higher potentials for wind, others for solar, geothermal or algae. Depending the properties of the 3D-landscape,[1] specific renewables will need to be located in specific areas.

The design (Fig. 5.6) depicts these areas and proposes specific land-use for each of them. The area of the **Peat Colonies** forms the main supplier of energy and food. The 250 km^2 PV-coated greenhouses are projected in this area and combined with the largest available wind-turbines. The electricity produced in this area is 68 PJ. The crops in the greenhouses use CO_2, potentially derived from carbon emitting industries and other functions, to grow, which turns them into a net carbon sink. Excess heat, produced in the greenhouses will be stored in the underground to be used in households, offices or back into greenhouses in colder periods. The eastern part of the Peat Colonies is developed as an international valuable nature reserve, connecting with similar areas in Germany. The **North-East Groningen** area is

[1] The 3D-landscape consists of the airspace (determined by the local climate), the surface (determined by top-soil and land use) and the (deeper) underground (determined by geological layers, such as aquifers, sand-, clay- or rocky layers).

blessed with a very fertile soil, an excellent space to grow primary crops for food (beans, potatoes) or goods (fibre, rapeseed, bio-fuel crops). To the north western side of this area the elevation of the land is the lowest in the area, making it the most vulnerable fort for floods. Moreover, due to its low surface it takes the biggest effort to pump the water out of this area. Therefore, this area is transformed into an inundation area, where seawater can enter the hinterland in a controlled way. Under influence of tides, a brackish landscape emerges, perfectly suited to grow saline cops and algae.

The **Green Industrial Heart**, centrally located in the region is the bio-based hub of the region. All bio-based resources from the Peat Colonies and North East Groningen are processed in the Industrial Heart to produce food, materials, energy, bio-fuels, to process organic waste and treat wastewater. High-tech industries and the economy of scale turn this area into the new economic engine of the region and functions as the central energy distribution hub, preventing large energy-losses. The area north of the Green Industrial Heart (marked with a question mark in the map) is kept free of developments, so it can be occupied with bio-based industries if the central area is a success. It opens the opportunity to connect to the Eems-Harbour, where import of raw material and export of bio-based products is possible. The existing **City of Groningen** with its large number of existing housing stock is vulnerable for e-novative[2] changes. Quick adaptation is difficult, but required here. Whilst difficult to make a transition in the city to solar or wind, processing waste to heat is the option with more potential. For electricity supply, the city is dependent on the Green Industrial Heart or needs to be redesigned and adjusted to a large extent. **Groningen North**, of which the historical landscape of the Reitdiep and the World Heritage site of Middag Humsterland are part, will regain open exchange with the Wadden Sea. This enables the building of a tidal plant at the edge of land and sea and the growth of saline crops and fish farms. Due to its geothermal potentials heat is abundantly available for residential housing and office buildings, as well as providing a variety of recreational uses with energy. Along the **Northern Coast** wind-farms are proposed, supplying 20 PJ of electricity annually. Together with primary food production and fish farms, this area is characterised through the landing points for helium-fuelled airships (Zappelins), which will serve as the middle range travel means. All these propositions require a smart storage system, because the energy required is not evenly distributed in time. The area offers a couple of area specific options to store energy: store compressed air in the underground (in the existing salt caverns) and creating fall lakes[3] (in the Wadden Sea, in the inundation area or in the Hunze zone and Drenthe plateau). Together with universal storage options, such as electric vehicles or water towers, storage can be arrange using smart techniques, which streamlines storage and release of energy,

[2] E-novations are innovations in the energy system, such as smart grids, computer and Internet directed services and agile and self-operating technical grids.

[3] A fall lake is a water storage at a certain altitude to which water is pumped up in times of energy abundance, which will be released in times of energy scarcity, letting the stored energy back in the grid.

Table 5.1 Overview energy calculations, providing energy demand 2050 fully renewable (Roggema and Boneschansker 2010)

Source	Amount/year
Wind energy	20.3 PJe
Heat (households)	6.6 PJth
Solar energy	45-67.5 PJe
Mobility & Industry	
- Biogas	15.8 PJth
- Ethanol	0.5 PJth
- Biodiesel (algae)	1.9 PJth
TOTAL	**90.1–112.6PJ**

5.6.3 Calculations

For these spatial proposals the energy use has been calculated (Roggema and Boneschansker 2010). Assuming 50 % of current energy use is saved and households are 'capped' at 1,000 kWh/year. supplying the region completely with energy from renewable resources is possible. The majority of the supply comes from solar energy (Table 5.1).

5.6.4 Governance

In order to realise a future energy system, which differs from the current takes a long time. As mentioned earlier this may last 50–70 years. Current government structures are established entities, which means that they tend to build on former constellations and agreements. They end to repeat what once was. This contradicts with the objective to realise a fundamentally new energy system. Therefore a new governance system is aligned with the proposed changes in energy supply. The new governance structure consists of two levels of assembly, the higher and lower level.

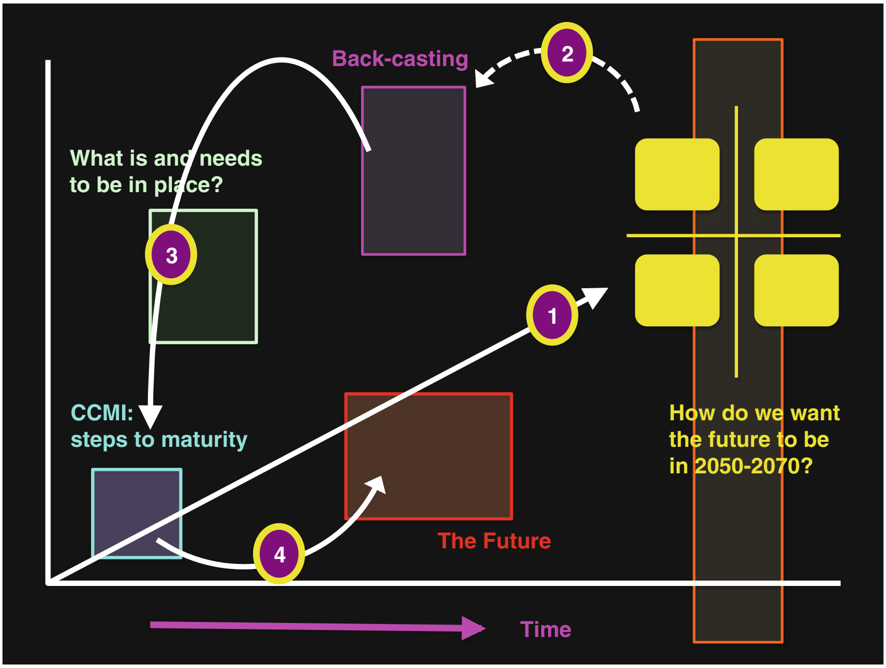

Fig. 5.7 Back-casting process in combination with process improvements through CMMI

Both are elected, but for a short period of time, 1 year. The higher assembly provides the lower assembly with knowledge, technology and budgets (Consultation stage). With these means the lower assembly needs to realise innovative projects within their time-limits of 1 year (Action stage). After implementation of the measures the local community will evaluate the projects and can ultimately show appreciation by re-electing the members of the lower assembly (Evaluation stage). The short cycles press the lower assembly to take action, but is assures at the same time continuous interactivity between assembly and community. This is necessary, because of the long lasting period of change that is required to reach a new completely renewable energy system. It also allows for adjustments 'along the way'. New insights, externally developed or derived from the internal evaluation process can be implemented instantly, preventing the system to determine 'no other option is possible'.

5.6.5 Backcasting

Once the long-term vision is developed, the question is how to achieve this desired future? The way this question was approached made use of the back-casting technique (see also Chap. 4). In this process (Fig. 5.7) future scenarios are developed first. These scenarios envision the future in 2050–2070, being the timespan within which a systemic change can be fully completed. Once these future scenarios have been developed the back-casting process brings the future objectives back to the present in the form of measures and strategies that are part of the ultimately desired future. The main question asked after having defined these is: "What needs to be in place?" before the next required step can be undertaken. The first step starting from the present then can be identified using the CMMI methodology (www.cmmiinstitute.com). Firstly it needs to be identified what already is in place in order to define the level of maturity of the system, after which the measures and strategies can be defined, which allow the system to grow further to the first maturity level up.

5.6.6 Developing Towards a Mature System

The components of the back-casting process emphasise different requirements in different phases of the process. For instance, envisioning a desired future for 2050 or 2070 can be facilitated by developing scenarios, or by using interactive design tools, or by using focus groups amongst other approaches. The back-casting itself (e.g. the definition of concrete measures that need to be achieved at the end of the realisation and which will ultimately shape the concrete future), delivers the concrete spatial measures to be realised in the (far) future, not necessarily the same as the ones that can be realised in the present. Therefore, the thinking (and realisation) needs to take place in steps. The proposed future system in the end needs to be a system functioning in its maturity phase, but before it can reach this level it needs to be developed in smaller steps of growing maturity. The CMMI (Capability, Maturity, Modelling, Integration) approach defines the principles how processes can be improved in a systemic way (CMMI Product Team 2010). CMMI is based on the basic principles of CMM (Humphrey 1989). Within CMMI two different stages are distinguished: the stage of becoming more capable, and the stage becoming mature. Only mature systems function independently and autonomous, so before a future energy system can function in its full glory. Hence it needs to operate at the highest level of maturity. The levels of maturity[4] are: initial, managed, defined, quantitatively managed and optimising.

1. At the initial level of maturity the system is chaotic and unstable. When a project is successful, it is often incidental, too expensive and will be abandoned in times of crisis. Projects and success suffers from coincidence. The system is in its infancy;
2. The managed level of maturity plans and executes projects in accordance with policy. These projects satisfy specified descriptions, standards, and procedures. Adequate resources are available and projects are continued even in times of stress. The system is tuned at 'not to fail';

[4] For reference, the capability levels are: incomplete, performed, managed and defined. Note that capability level 'performed' matches the maturity level 'initial' (CMMI Product Team 2010).

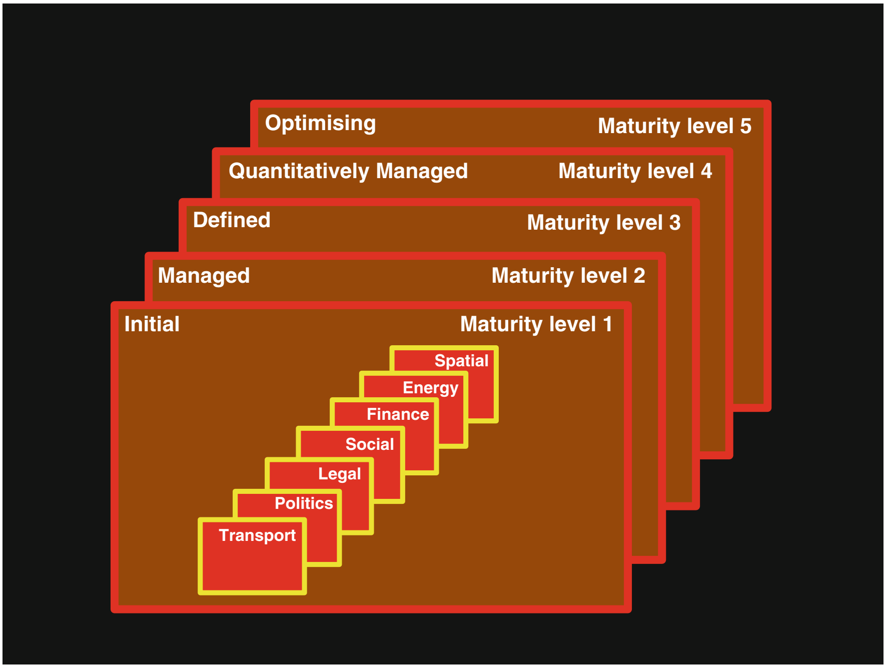

Fig. 5.8 CMMI model applied to the energy system (Adapted from Roggema et al. 2008)

3. The defined level of maturity in which standards, procedures, tools, and methods are well established and consistent. These rigorously described tools are tailored for the specific objective and proactively managed using the understanding of interrelationships of project elements. The system is aligned for specific purposes;
4. At the maturity level of 'quantitatively managed' statistics underpin quantitative project objectives, which are determined by the needs of the customer, end user or inhabitants. The system is shaped to external demands;
5. The optimizing maturity level establishes qualitative objectives, which are continually revised to reflect changing demand and to measure improvement. Continuous adjustments, based on shortfalls or gaps, direct the system towards overall improved performance. The system is dynamical adaptive to change over longer periods of time (Fig. 5.8).

The maturity stages of the CMMI model can be used to improve the performance of identified areas at each maturity level. The project areas, such as transport, politics, legal, social, financial, energy and spatial, are grouped at each maturity level, indicating the improvements that are required for each of the areas to achieve its objectives at each maturity level. All objectives of each area need to be satisfied before the next level of maturity is achieved.

In case of the transformation to a fully renewable energy supply, the first step is to identify for each of these project areas at what maturity level elements of each of the areas are currently already in place, before striving for the next level. The design, result of INCREASE, as presented before, is still in its initial phase when legal, political and financial aspects are taken into account. Despite the fact that other areas already are in defined or managed phases, the lack of maturity of some of the areas means that realization of the desired future is still in its infancy.

5.7 INCREASE: Advantages

The two INCREASE charrettes are specific in several ways. In order to improve the results, innovation potential and rigour of research the following aspects determine the success of the INCREASE conferences:

1. Preparation: In advance of the INCREASE conferences proceedings are published. Each participant has to prepare an academic paper on and related to the specific theme of the conference. Each paper is reviewed before it can be included in the proceedings. These papers are presented during the conference. All papers, along with the welcoming words by (regional) ministers or directors, description of the conference theme, participants profiles and the program are published in the proceedings beforehand (Roggema 2009b). This process assures the right focus of participants and guarantees that participants have started their thinking process way ahead of the conference. It smoothens the way the conference starts-up and progresses along the way;
2. Selection of participants: The people are approached individually on the basis of existing network contacts, their well-known expertise in the field and their cooperative attitude. The invited group is around 15 individuals and are sought for from around the globe. This group of 15 is the inner working group, obliged to write a paper beforehand and attending all sessions. The types of expertise desired in this group ranges from energy technology expertise, to design and planning professionalism and policy-making and governance. Outside this group a group of 40–70 people are invited for the opening ceremony and the final presentations. This group is recruited mostly from the local community;
3. Rules for participation: The participants that are invited need to comply with a couple of simple rules. They will not receive a fee for their time spend in INCREASE and they need to arrange for their own travel costs. These two rules were put in place so that people are really committed when they participate, because they wouldn't disengage after having spend a certain amount of resource;
4. Extraordinary venue: The choice for the country, city and venue needs to be an extraordinary one. To travel a long way, and having to pay for your own fare and time makes it worth if the place you visit is interesting, or a place you wouldn't visit easily. Further, an excursion to a cultural heritage site (which obviously needs to be available in the country of visit) is included in the program to offer value and experience during INCREASE;

	Individual or collective learning	Nature of learning domain	Kolb experimental learning cycle	Depth of learning impact
Distributive	Individual	Tame problems Technical challenges	Conceptualisa-tion only	First level learning
Interactive	Individual	Tame problems Technical challenges	Conceptualisa-tion and experimenting with new behaviour	First or second learning level
Collaborative	Collective and individual	Wicked problems Adaptive challenges	All stages of cycle (and multiple times)	Third learning level

Fig. 5.9 Learning as occurred in INCREASE positioned in the learning framework (After: Vos 2013, see Chap. 3)

5. Intellectual challenge: everyone is talking about minimising carbon emissions and the majority of all the efforts are only half successful. The INCREASE environment offers the chance to discuss and develop an ultimate vision of zero carbon emissions without any practical constraints: it is taken out of daily policy-making and solutions do not have to comply with specific regulations and expectations. Moreover, ensured to find other extraordinary thinkers around the table offers the intellectual challenge with likeminded to discuss on high levels.

The way learning takes place during the INCREASE conferences goes beyond simple technical exchange of knowledge. It is a collective process in which not only experimentation takes place, reflections are shared, new conceptualisation occurs, and the values of each individual are treated and challenged. This causes a deep level of learning in a collaborative mode (Fig. 5.9).

5.8 INCREASE in the Charrette Wheel

The INCREASE conferences focus on the regional spatial level, which implies attention for the urban, sub-urban, peri-urban and rural landscapes. The issues to deal with are of a complex nature as decisions and propositions influence each other and cause an on-going and emergent transformation of the energy system. The focus

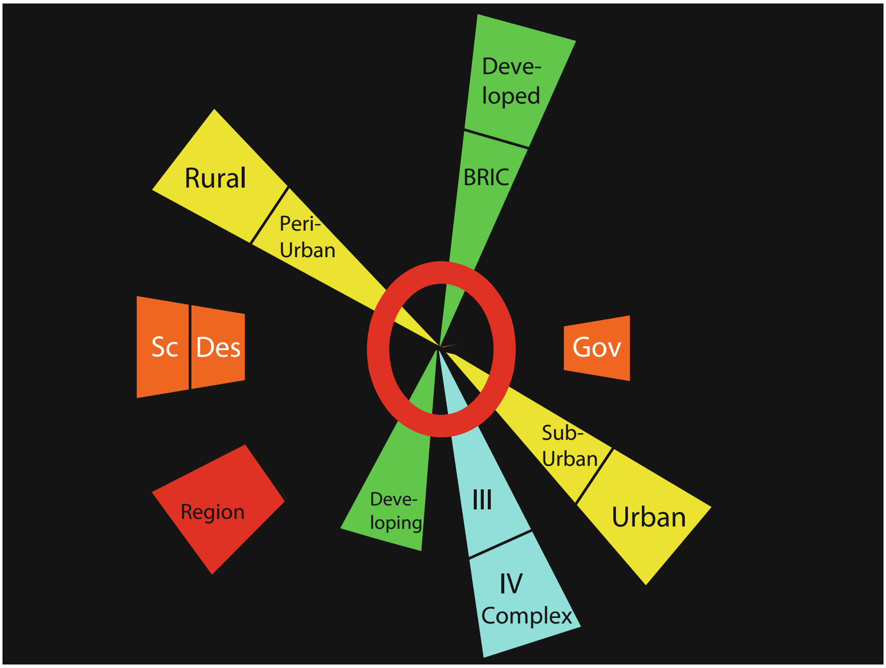

Fig. 5.10 INCREASE occupying the Charrette-wheel

area of research is Groningen province, but there is a wider spread of knowledge through the two conference conducted in Jordan and China. The participation in INCREASE is limited to policy-making (government), academics and designers, only a small slice of the range of potential stakeholders (Fig. 5.10).

5.9 Conclusion

The concept of a design charrette enduring 4–5 days with some additional experiences proves to be a very solid and enjoyable format. The mix between serious and hard work and the loosen side of things gives participants the feeling to contribute continuously to the debate, which is excellent. In the INCREASE charrettes illustrate that a 1 week charrette can deliver substantial outputs, ready for take up in the policy and decision-making arena.

The constellation of working and designing with high quality experts only makes it easy to go deep into the substance, but at the same time it can be qualified as a lonely place to end up, as no other stakeholders (industries, citizens, NGO's) are aware of the innovations thought out during the charrette.

The combination of expertise, energy technology, design and planning and governance is very helpful to design propositions that are sound, acceptable and beautiful.

However, as the CMMI model illustrates, the results after two INCREASE conferences must be capped under the infancy level of maturity because, legal or financial areas are not grown in maturity. The linkages with these ‘other’ areas, needed to transform the energy system need to be further explored to realise the desired future system.

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Chapter 6
Design Charrettes in Two Days: Sea Lake and Bendigo

Rob Roggema, John Martin, Mark Remnant, Grant Alday, and Prue Mansfield

6.1 Introduction

The Victorian Centre for Climate Change Adaptation Research (VCCCAR), established in 2009 and funded by the Victorian Government, aims to improve government and community understanding about the potential impacts of climate change and to assist individuals, communities and institutions to develop appropriate adaptation options. It does this through the funding of interdisciplinary and multi-institutional research projects, which address priorities identified by the Victorian Government. Climate adaptation has become an important consideration when discussing future development trajectories for cities and regions across the State.

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This connection between the required adaptation and the desired urban and regional spatial development has been the major driving force for the development of the project 'Design-led Decision Support for Regional Climate Adaptation' (Roggema et al. 2011a). This project takes as a starting point the premise that knowing about possible hazards and assessing their risk is an important step in understanding and dealing with climate change. However it doesn't give us answers as to how to design our landscapes and societies to adapt to climate change impacts. Local and regional communities were supported in their decision-making on the precautions they need and want to take to adapt to future climate impacts. In order to bring academic knowledge closer to the communities where the knowledge needs to be used, the chosen approach of conducting design charrettes[1] is not only an academic exercise, but more so a practical hands-on process. This means that the outcomes are easily disseminated towards regional communities, but also that the process of planning and researching is dependent on the local context, timing and (political) concerns. These design charrettes have been conducted covering locals in the City of Greater Bendigo and in Sea Lake, one of several small towns in the Buloke Shire several hundred kilometres north west of Bendigo. Both places are in central Victoria, north of the Great Dividing Range.

6.2 Bendigo and Sea Lake: Hot Dry and Vulnerable

Bendigo and Sea Lake are two very different settlements. The communities have been chosen for design charrettes because their councils differ in size and capacity to respond. They face different climate impacts, and both have a very supportive council, including both elected members and staff.

Bendigo is a major regional centre located about 150 km northwest of Melbourne with a population approaching 105,000 people. The Jaara people originally inhabited the region and first Europeans settled in Bendigo (then known as Sandhurst) in the 1830s as result of pastoral activity and even more rapidly in the 1850s when gold was first discovered. Water was needed to carry out mining activities, and at the time of the gold rush, the Bendigo Creek, typically dry and occasionally flooding, was the only local source of water. Since that time Bendigo remains dependent on external sources of water. Bendigo is currently a bustling modern city characterised by nineteenth century architecture, tree-lined streets and picturesque parks and gardens. In 2050 the population of the City of Greater Bendigo (covering an area radiating some 25 km around the centre of Bendigo) is projected to increase by 55,000 inhabitants to a total around 160,000 people. This impacts demand for new houses, calculated at 18,000 units up to 2050 (Parsons Brinckerhoff 2004). The main economic drivers in Bendigo are health care, education, manufacturing and social assistance. According to the Residential Development Strategy (Parsons Brinckerhoff 2004) Greater Bendigo strives to become a:

[1] A design charrette is a multiple day intensive and creative design workshop in which participants originating from many disciplines collaborate on future visioning.

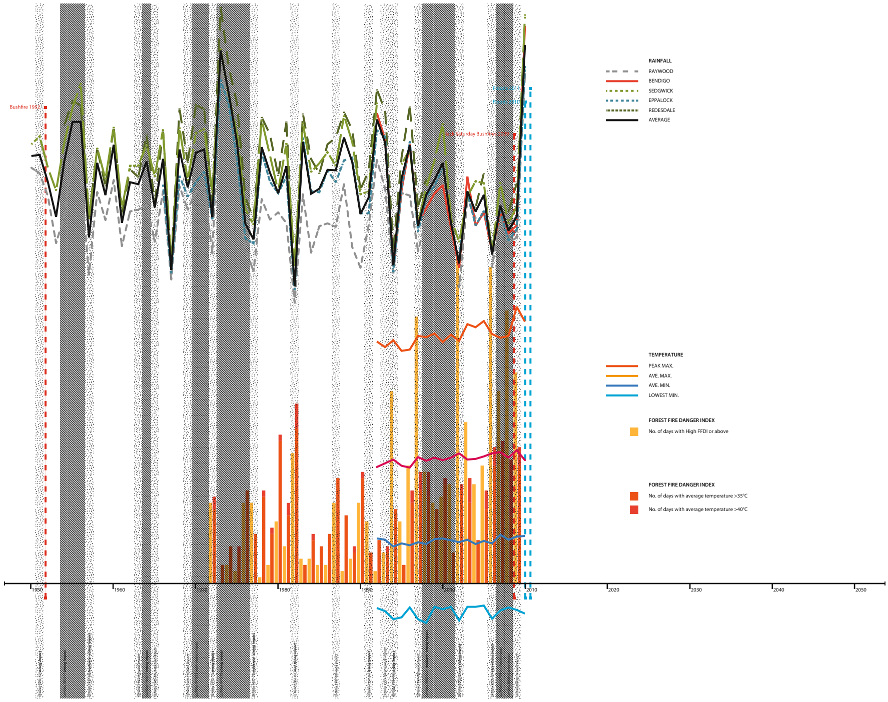

Fig. 6.1 Correlation between rainfall, temperature, El Niño and El Niña effects and the occurrence of disasters such as bushfires and floods in the Bendigo region

1. **Progressive City** evidenced by the growth in the economy and subsequent increase in socio-economic status and knowledge and skills base of the community;
2. **Vibrant City** with a rich and diverse cultural and social life in which all members of the community are healthy and feel safe;
3. **Caring City** in which the natural environment has been preserved to create both recreational opportunities and habitat for native flora and fauna, and the heritage assets have been conserved and enhanced.

While predictions of climate change impacts, such as temperature increases and reduced rainfall are dire. Summer heat, drought and reduced water availability has been experienced many times in the recent past and is predicted to be more prevalent in the future. Bendigo has been impacted by drought and is subject to water restrictions since 2002. Although detailed weather data for the Greater Bendigo region is not readily available, there is sufficient information to identify the weather patterns and extreme weather events that are already happening (Fig. 6.1). This pattern correlates with weather patterns in the region and local weather events such as floods, droughts and bushfires.

Buloke Shire is a predominantly rural region located in North Eastern Victoria, on the eastern edge of the Wimmera plains in the southern Mallee. It is approximately 300 km from Melbourne, and consists of 10 key towns, the 5 largest being Birchip, Charlton, Donald, Sea Lake and Wycheproof. At present, agriculture constitutes the largest economic and employment sector, with much of the land use taken up by grain production (wheat, oats and barley) and sheep grazing. Sea Lake is located in the Mallee Ward, in the Buloke Shire. Prior to European settlement, the Boorong people inhabited this area. Sea Lake has a dry climate, the basis for its 'dryland' agriculture, and is part of Australia's wheat belt. Adjacent to the town of Sea Lake is the salt lake, Lake Tyrrell.

The major problems in Sea Lake are the following:

- Climate and weather becoming increasingly dryer, drought lasting longer and higher temperatures cause more intense heat, and more storm events;
- The capacity of the landscape to deal with excess rainfall caused by more severe and sudden rain events, leading to occasional floods, and more frequent droughts, increased soil erosion and crop failures;
- Heat waves in the village will increasingly effect the elderly, infirmed and young;
- In the period 2001–2011 the population of the Mallee ward decreased by 118 people, which is – 0.5 % per year. This trend is expected to continue.

The Sea Lake community plan (Advance Sea Lake Inc. and Buloke Shire 2009) identified five responses:

1. Maintaining and growing essential services. All essential services should be available in the town. This leads to a healthier community and makes it easier to attract new residents;
2. Stimulating the local economy. Encouragement of new business and expansion of existing ones improve the local economy, which benefits the local community;
3. Tourism. Further development of natural assets and festivals to increase number of tourists visiting Sea Lake;
4. Strengthening and growing the community. Provide residents with a sense of social connectedness;
5. Caring for our environment. Become more ecological sustainable and environmentally aware.

These objectives illustrate the integrated character of the responses, aiming to improve the resilience in the town of Sea Lake.

6.3 Objectives and Assignment

In dealing with uncertain and most likely increasing intensities of climate impacts in regional towns and regions these communities will need to become more resilient to these impacts and become more capable to deal with unforeseen (climatic or other) events. In the design charrettes a positively and optimistic framed question 'What might a 'climate-proof' future look like?' instead of the more negatively framed 'How do we become resistant and protect ourselves against the impacts of climate change?' is asked.

The main objective the design charrettes is formulated as follows (Roggema 2011a, b, c, 2012a):

> "To develop a range of future scenarios, which all sketch a future image of a community that is safe, sustainable and resilient"

These design charrettes also contribute to general formulated objectives. They:

1. **Integrate climate adaptation in regional planning and design**. The design and planning of urbanised areas and rural landscape is interwoven with (climate) adaptation. The way communities are organised and operate is strongly related to the way the built environment and the natural landscape appear and/or are planned;
2. **Facilitate knowledge transfer**. New planning concepts, new approaches and new knowledge that are deployed, will be captured and transferred to the broader community of planning and design, government departments and other councils;
3. **Facilitate regional policymaking**. The impacts of weather events are experienced at the regional level (or even above). Innovative approaches and partnerships need to recognise this and develop collaboration at the regional level. The boundaries must be collectively understood in order to be capable to develop a regional future vision;
4. **Promote a resilient, sustainable future**. Hazards are of all times and disasters will keep on happening in the future. Creating a resilient and sustainable region mitigates these impacts. Increased resiliency and sustainability won't hurt if disasters do not occur and nevertheless contribute to a healthier and more coherent community.

6.4 Methodology of the Victorian Charrettes

The design charrette processes in Bendigo and Sea Lake were conducted using the same methodology, roughly summarised as 'diverge-appraise-converge'. The methodology consists of five distinct steps (Fig. 6.2).

1. In the first step – preparation – relevant data are collected and maps are constructed. Meanwhile, the network of relevant stakeholders and participants is developed. In the last phase of the preparation the detailed program is designed, the list of participants is completed and all practical arrangements are taken care of. Approximately a week before the charrette is executed, the design brief, in which all background and practical information is brought together is sent out to participants.

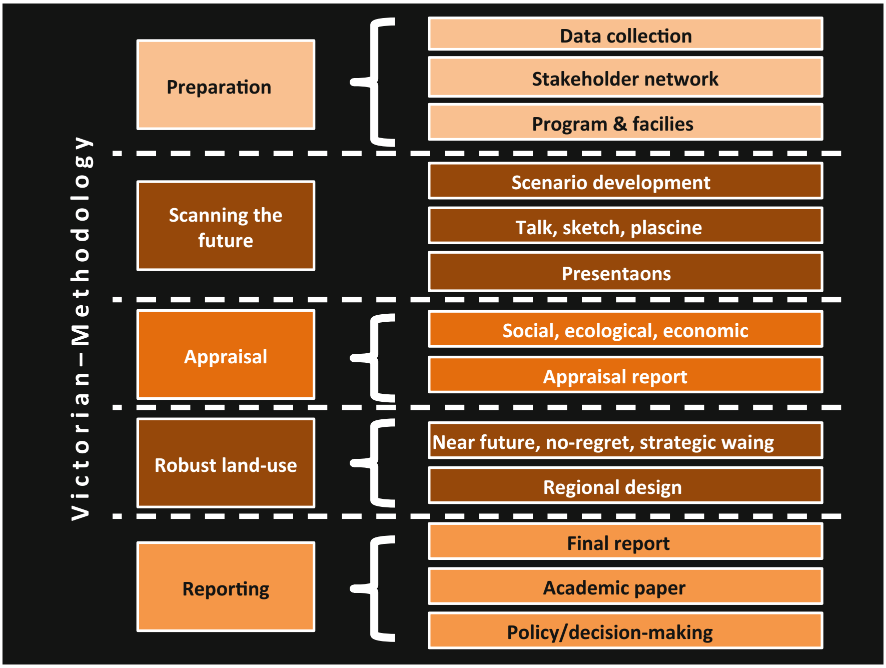

Fig. 6.2 Methodology of the Victorian charrettes

2. Step two – Scanning the Future – is the first design charrette. In this step a wide range of positive, tangible and useful solutions for possible climate impacts are identified. This step is divergent of character and focuses through group work on different scales, different themes and different areas. A very specific part of the Scanning the Future step is working with plasticine. During the first charrette plasticine is used towards the end of the 2 days, when all the ideas roar around the room and are drawn up on butchers paper. At this stage the boxes with plasticine are distributed and people are invited to work in groups to literally build a model of their desired future. After participants get used to the fun of working with plasticine the first buildings, roads, crops, animals and human beings are sculptured and placed appropriately on the map of the town or locale. Inhibitions are removed by now and the exchange of ideas occurs at an unprecedented rate. Participants are challenging each other and questioning their respective models and its place on the landscape. This tactile way of working opens the opportunity to ask and answer without the usual constraints people have as representatives of a certain group or organisation. From this exercise new plans and ideas are created on each table, contributing to the broad range of design solutions, each with own merits and advantages. "Every five-year old knows that plasticine is an essential learning and building tool. The charrette emphasises the idea of flexible and creative adaptation planning. Several groups start to work in exercises using

maps of the local area at small and large scale. In this phase of the process, most people start off with current plans uppermost in their minds, making small modifications. As the charrette proceeds, the number of creative suggestions increases. People's horizons expand as ideas bounce off each other. Subsequently four scenarios, type-casted by one-line themes that come up throughout the workshop, were subject of a map-based exercise using plasticine to craft design elements. Before starting to use the plasticine, each group develops a set of design principles for each scenario. This exercise results in the proposal of a range of innovative design ideas, which might not have emerged if discussions stayed within the bounds of current plans" (Jones 2011). The first charrette is finished with an intermediate report (Roggema 2011a, b, c, 2012b, 2012c).

3. The third step is the appraisal. The results from the charrette, being a broad spectrum of possible solutions, are socially, ecologically and economically appraised. The accurately drawn maps and pictures of the plasticine models are suitable for a rough appraisal (Clune and Hunter 2011; Clune 2012).
4. Robust Land Use is step four, in which the results of the appraisal are used to inform a second charrette. During the second charrette the range of ideas from the first charrette are converged into one or two long-term visions that are integrative of character and unify several of the solutions that have been developed earlier. In this 'robust land-use plan' a commonly felt spatial pathway for the future is developed consisting of three types of design measures: 'near future interventions', 'no-regret' and 'strategic waiting' measures. *Near-future interventions* are measures that have been decided in the past, but have not yet been realised. *No-regret measures* can be realised and are beneficial in a wide range (or all) possible future scenarios. Realising these measures is literally of no regret. *Strategic waiting* measures are spatially defined areas in the vicinity that 'wait' for a final destination in expectation of a clearer image of how the future is going to develop over time.
5. The reporting is the last step in the process. This report with all the results of the design charrette process can be used in on-going policymaking and –decisions, but it will also function as a base of reference for the longer term and catalogue for developing new and more detailed projects. Finally, the report will inform State Government policy development regarding climate adaptation and spatial planning (Clune et al. 2012).

There are many ways to frame behaviour in dealing with climatic risks (Fig. 6.3). The four squares, arising from combinations of modifying behaviour or the environment and plan for or react to risks are defined as follows:

- **Modify behaviour and plan for risk**: Change nature of activity and engagement to reduce harmful outcomes. For example, this would mean altering settlement patterns in high fire danger areas and more in general modifying one's behaviour to the properties of the environment;
- **Modify behaviour and react to risk**: Continue to live your life as you did before. It's business as usual and one need to roll with the punches;

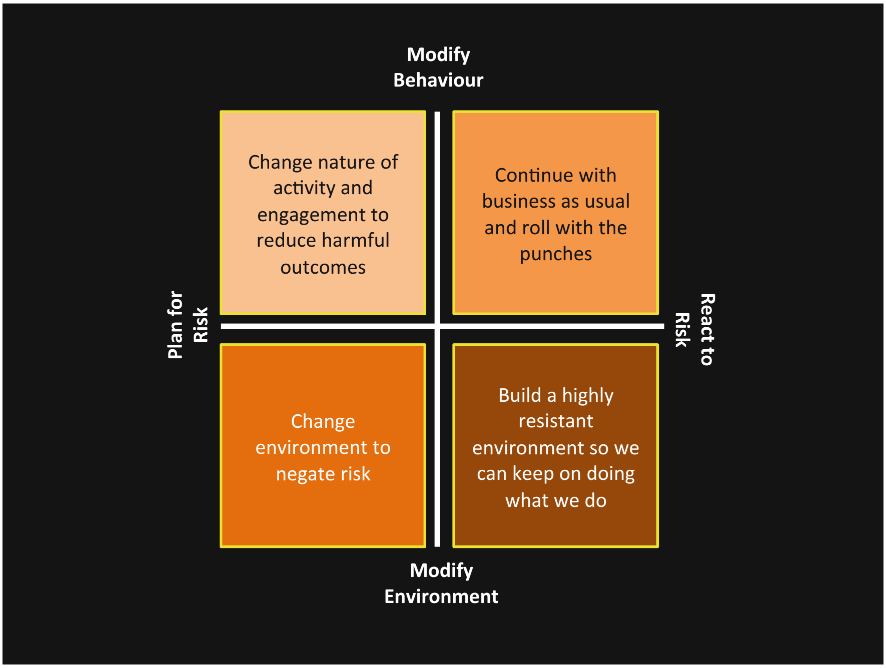

Fig. 6.3 Framing the design propositions in a climate adaptation context (Adapted from Jones 2011)

- **Modify environment and plan for risk**: Change environment to negate risk. This could mean burning peri-urban areas to ensure that there's no fuel to burn (negative) or altering the urban environment to modify heat stress (positive);
- **Modify environment and react to risk**: Build a highly resistant environment so we can keep on doing what we did. After a disaster we build concrete bunkers, put in air conditioners and bunker down for the next one. Let's face it: the environment is a scary place.

In a complex setting, adaptation will involve all four quadrants. It depends on the risk and how it will manifest, the full economics of the situation, the amenity (or lack of it) leading to the exposure in the first place, who pays before and after a disaster happens and who decides on shifting quadrants. A transformation involves switching the quadrant's centre of gravity. Design principles are framed according to this idea. For example, when policy proposes solutions in a frame that modifies the environment and plans for risk different design measures are considered than in a situation where the problem and its solutions are framed as behaviour change and reactions to risks. The first step towards finding the applicable design measures is to define the square the problem is framed.

The results of these design charrettes are – apart from traditional ways of preparing written reports – presented as sketches, visualisations and 3D-models. This kind

Fig. 6.4 Atmosphere during the Sea Lake charrette (Drawing by: Inez Roggema)

of output represents the atmosphere developed during the charrettes (Fig. 6.4) and the richness of solutions exemplify the efforts put in and the potential available in local communities to contribute to, what is often abstract, future thinking.

6.5 In Bendigo and Sea Lake

The City of Greater Bendigo is the fourth largest city in Victoria and has a strong regional function, both economically and socially. The city is surrounded by forests, and this fact – combined with the pressure to offer new development areas for its growing population – implies an increased vulnerability for bushfires. Bendigo has to deal with higher temperatures during summer leading to droughts and ecosystem pressure. It also has to deal with occasional floods after heavy rainfall, with which the city's sewage and drainage system cannot cope. Council is constantly aware of the risks and challenges and considers many different options in its spatial policies. The environmental values are always a dominant topic. These wide concerns brought a wide spectrum of participants to the design charrette. Industry partners, developers, a diverse range of governmental departments and planners, and specialist experts were brought together with (climate) scientists, designers, students and State government representatives (Fig. 6.5).

The key elements of the program are design sessions around critical climate landscapes, an exercise to design adaptation strategies for landscapes that are particularly under threat of climate impacts, e.g. the most vulnerable for bushfires.

Fig. 6.5 Intermediate presentation during the Bendigo charrette

Secondly, the design of ‘reverse scaling’, which asks several groups to take on the design of the region as a whole, while other groups look at particular sites at the local scale. The groups then swap scales forcing each other to scale up or down as the case maybe. Finally, 3D-models are build with plasticine at mid scale, in between the whole region and local level, and the first quick scan of the designs are appraised (Fig. 6.6).

Sea Lake is a small town in the middle of the wheat belt in northwest Victoria. The predominantly agricultural population of around 500 people is actively involved in community building, economic development and show strong environmental values. The Advance Sea Lake Inc. group is a collaboration of local people with a range of different backgrounds, propagating and encouraging future improvements. This group took the lead in defining the assignment, deciding on stakeholders to involve and guiding the process of the design charrette.

Sea Lake is under threat of heat and droughts, which is expected to increase in the future. It is also expected that less rain will fall in a function of these extreme heat events occurring more often. This puts severe pressure on the way crops can be grown. The innovative mind-set of the farming population however, is a guarantee that these future challenges are being met. It also influenced an open and creative atmosphere during the charrette.

In Sea Lake a wide spread of experts and stakeholders (Fig. 6.7) took part, such as local citizens, governmental planners, State and council representatives, academics, students and designers. Parallel to this charrette a special charrette for primary school children was organised and linked at certain points to the ‘main’ charrette.

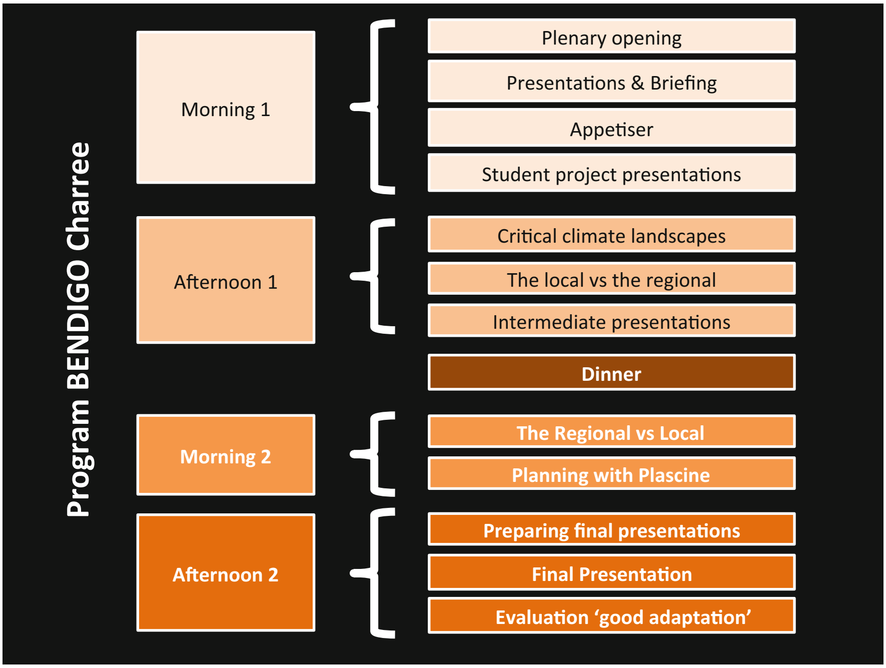

Fig. 6.6 Program of the Bendigo charrette

Fig. 6.7 Sketching during the Sea Lake charrette

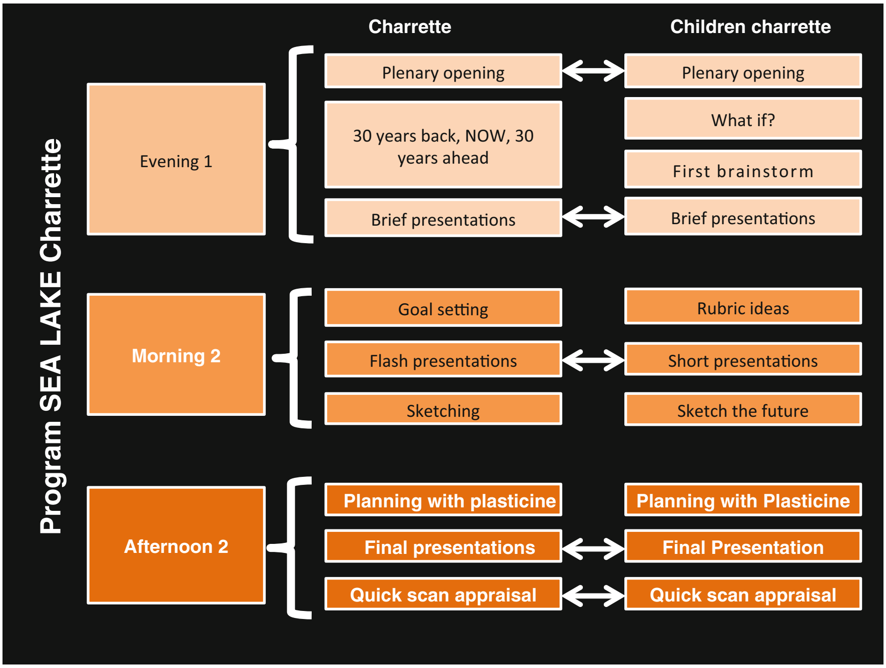

Fig. 6.8 The program of the Sea Lake charrette and the links with the children charrette

The children, ranging from 8 to 12 years of age, provoked the other participants with fresh and unconventional ideas, which inspired them to use these ideas as incentives in their own designs.

The main elements of the charrette program (Fig. 6.8) is the 30–30 exercise, which asks participants to think 30 years and describe how Sea lake looked in terms of economy, technology, climate and socially. And then asks them to do the same in a predictive way, 30 years ahead. The children in the meantime brainstormed about how Sea Lake would look like when climate becomes hotter and dryer. At the end of the first evening their findings were presented to each other, opening eyes for many. Secondly, the sketching took place in groups of which half focused on the surroundings of Sea Lake and the other half on the town itself. All groups finished with building the plasticine models adding new features to their design for Sea Lake and its immediate surrounding. During the several intermediate presentations exchanges took place between the children and 'main' charrette, causing mutual insight about how a long-term future for Sea Lake might look.

The Bendigo and Sea Lake charrettes emphasise the role of 'ordinary' experts and inhabitants as designers. The special feature of using plasticine for 3D modelling is a tool, which brings people closer together and helps them to visualise their designs.

6.6 Sea Lake and Bendigo: Life Saver Regions

The results of the design charrettes in Bendigo and Sea Lake emphasized the integrated nature of many of the issues at stake. In both cases the care for the environment, in a social, economic and ecological sense, formed the underlying driving force for many of the designs. Therefore, lifesaving comprehends in this context not only literally saving lives in case of climate impacts and disasters, but also the opportunity to improve the social and economic value of the community, not only saving life, but also safe 'living'.

6.6.1 Bendigo, General Outcomes

The Bendigo charrette produced several overarching results:

1. Self-sufficient and self-reliant communities
   Self-sufficiency, the ability to supply locally produced food, energy and clean water, mitigates climate change and increases sustainability, but it is also a way of living, in which people become aware of the vulnerability of the environment they live in. The self-reliance, the ability of the community to respond and survive a potential stronger hazard, such as bushfires, floods or extended heat waves, becomes increasingly important as life-saving services become less accountable.
2. Responsible and active citizens
   It becomes clear that governments can no longer guarantee a 100 % safety for all. Therefore people need to be encouraged to become active and act responsibly. This is even more important in the context of sudden unpredictable changes in climate.
3. Innovation
   A mobile phone, a computer and Internet were not available 10–15 years ago and changed the way we live, fundamentally. The iPhone and iPad are even more recent innovations. This illustrates we've always changed our lives, because we invented new and better ways to live. The transformation towards a low carbon society, which has to deal with the impacts of climate change induces subsequent, and an accelerating number of innovations.
4. Identity
   Bendigo is known as the old gold-mining town surrounded by forests. Both are very valuable trademarks. However, without new ones the city might suffer a status quo, which is, on balance, a regression. Potential unique identities may be: the solar power centre of Victoria, the safe and sustainable city or the city that is always prepared.
5. Density
   On-going urban sprawl leads to people living further away and drive longer distances and brings more people closer to higher risk areas (flooding, bushfires). Increasing building density minimises these effects. Urban developments should be kept within current boundaries and the existing boundary should shrink.

> This 'management of the boundary' requires innovative solutions for existing urban areas, retrofitting and new developments within existing neighbourhoods. The key challenge is to design semi-urban dense residential living near the natural bush landscape.

These principles are, in different combinations part of the four scenarios that have been designed during the charrette.

6.6.2 "The Shining Heart of the State"

In this scenario the connectedness in the community increases social resilience and uses the gold-mining tradition as inspiration for harvesting local resources.

In 'The shining heart of the State' (Fig. 6.9), Bendigo's identity of a gold-mining town is reinforced through renewed focus on harvesting natural resources. The regions resources are made productive. This means harvesting of electricity through solar farms, water through water harvesting plants and regional food production.

Energy security is promoted through the use of solar as primary energy source in buildings and solar farms. Relative low energy use is achieved through containing urban sprawl and realizing higher density secondary residential precincts, supported by a light rail to and from Bendigo and establishing a dense cycling network. In these residential areas the best urban design lay out is proposed and combined with specific purpose buildings such as passive cooling devices such as wind-towers.

Water security will be ensured through harvest, store and recycle water within buildings in combination with smart harvesting and recycling water infrastructure networks.

Local food production in the north supports self-sustained communities, whilst minimising food 'miles'. Agricultural waste is harvested to produce energy.

Integrated networks for re-distribution of energy and water sources encourage household connectedness (Fig. 6.10).

6.6.3 "The Lifesaver Region"

The design of this scenario focused predominately on residential designs preventing the urban areas from hazards by creating an urban boundary, which functions as a defence against fire.

In this model, the lifesaver region (Fig. 6.11), the urban areas are protected from fire and flooding to build a 'fortress', a strong urban structure that protects all that lies behind it. Urban centres and outer fringes are provided with a high-density ring of housing around it, becoming 'lifesavers'. In front of these high-density strings integrated corridors of open spaces and green infrastructure, which also operate as

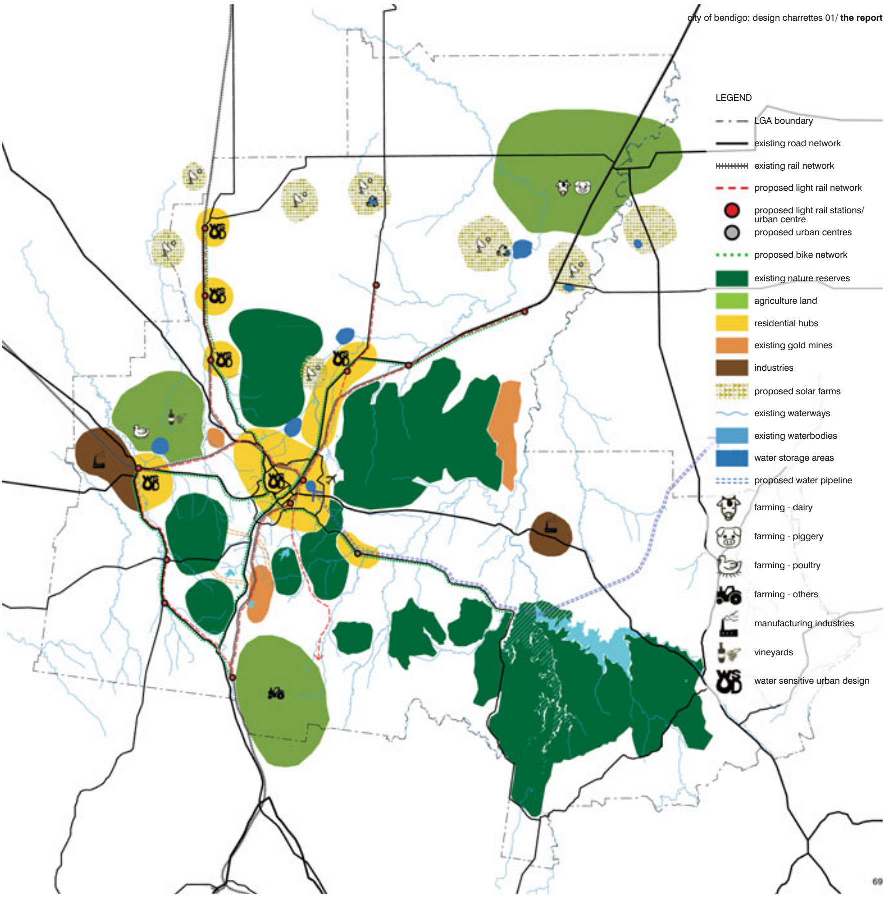

Fig. 6.9 The shining heart of the State

Fig. 6.10 Plasticine impressions

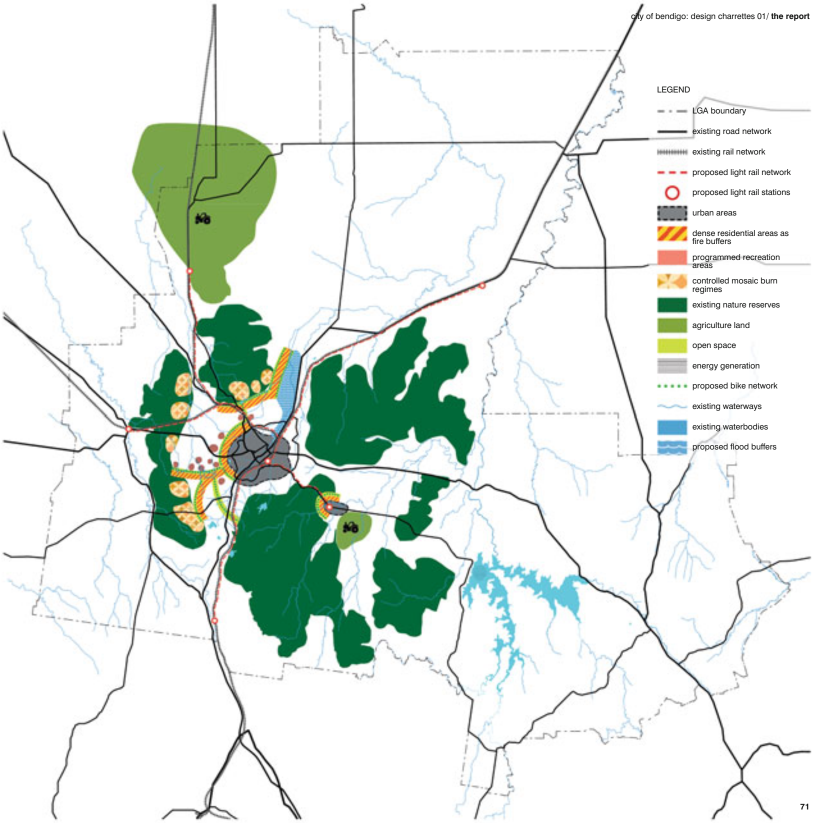

Fig. 6.11 Lifesaver region

flood buffers to reduce impact of floods, become a natural fire buffer for housing units and function as fire-fighting zones during bushfires.

Additionally, in this scenario a self-sufficient energy supply is proposed as well as rail and light-rail systems (Fig. 6.12).

6.6.4 "The Scarcer the Water…"

This scenario reduces the flood hazard and increases the resilience in the region to drought. The model focuses on water sensitive urban design and opts for localised food production (Fig. 6.13).

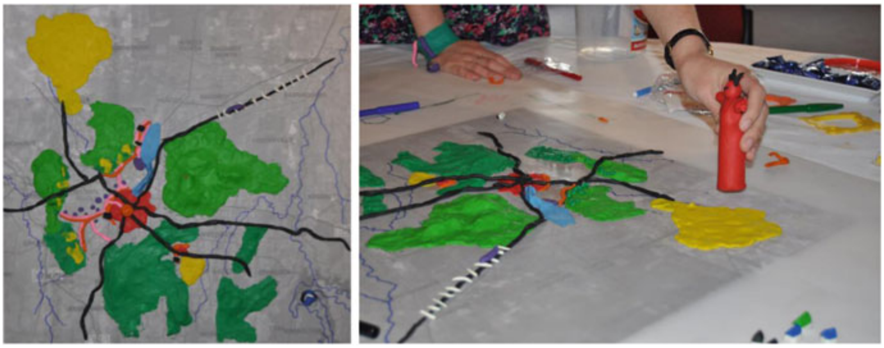

Fig. 6.12 Plasticine impressions

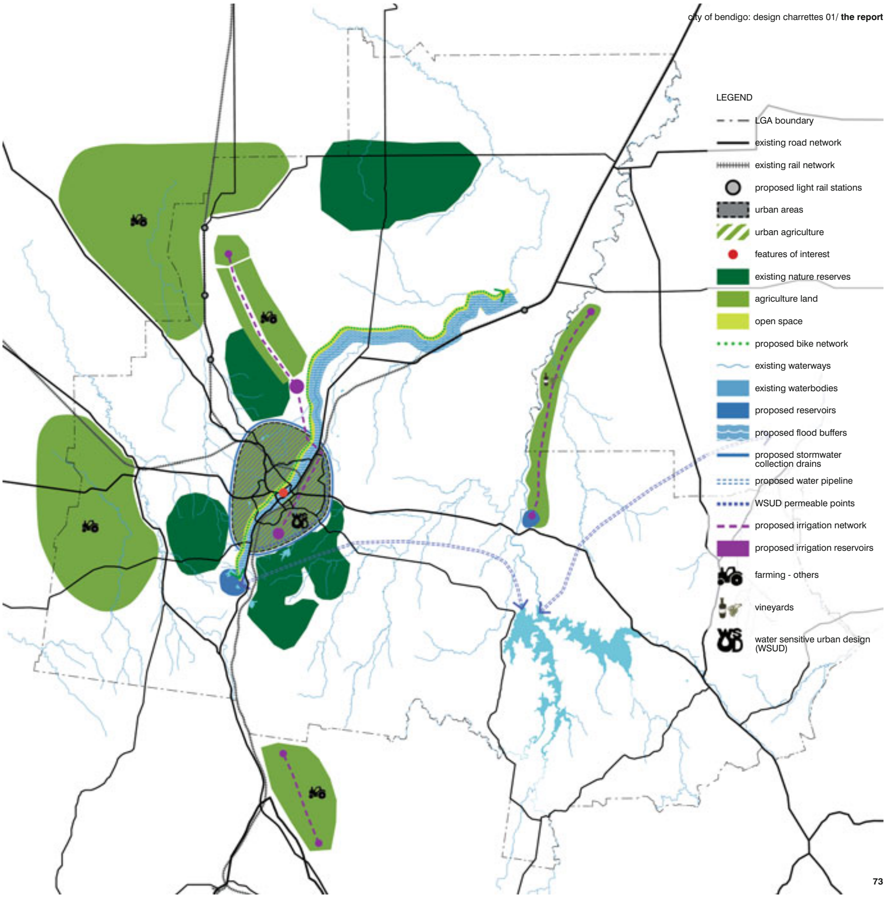

Fig. 6.13 The scarcer the water …

Fig. 6.14 Plasticine impressions

A wide range of water related propositions are suggested in 'the scarcer the water …'. A 'Productive, Liveable, Sustainable and Happy Community' is its main objective as it focuses on community engagement for instance through visible icons e.g. a clock tower water meter, encouraging responsibility of residents, and managing water efficiently through best practices of water capture and usage.

In the model storm-water is captured before it reaches the creeks and natural waterways are not only protected but also developed and enhanced. It is proposed to save as much water as possible when surpluses of rainfall occur and not letting floods 'go to waste'. At the urban, building level the principles of adaptive design (WSUD, for example: http://www.wsud.org), which in the Bendigo context consists of managing water seepages and evaporation, developing a self-contained housing typology with integrated water collection, solar energy systems and veggie garden, reduction water use through water-saving appliances, and realising zero discharge from treatment plants to streams.

Sustainable integrated agriculture is proposed to encourage self-sufficiency, leading to more food production in and around Bendigo, use stored water in urban areas for urban agriculture, e.g. balcony gardens, rooftops, etc. and develop market gardens in and near the city (Fig. 6.14).

6.6.5 "If You Can't Stand the Heat…"

In this scenario heat stress is addressed, which is looked at from being a hazard as well as a vulnerable community perspective (Fig. 6.15).

In the 'If you can't stand the heat …' scenario bushfires are accepted as a phenomenon that happens and community just has to deal with. The community is protected for fires through buffers. In response to the increasing number of hotter days refuge places, such as community centres, supermarkets, government buildings, are arranged in the urban fabric, and old gold mining shafts are re-used as cooling heads and cooling centres. The urban centre is developed as a higher density

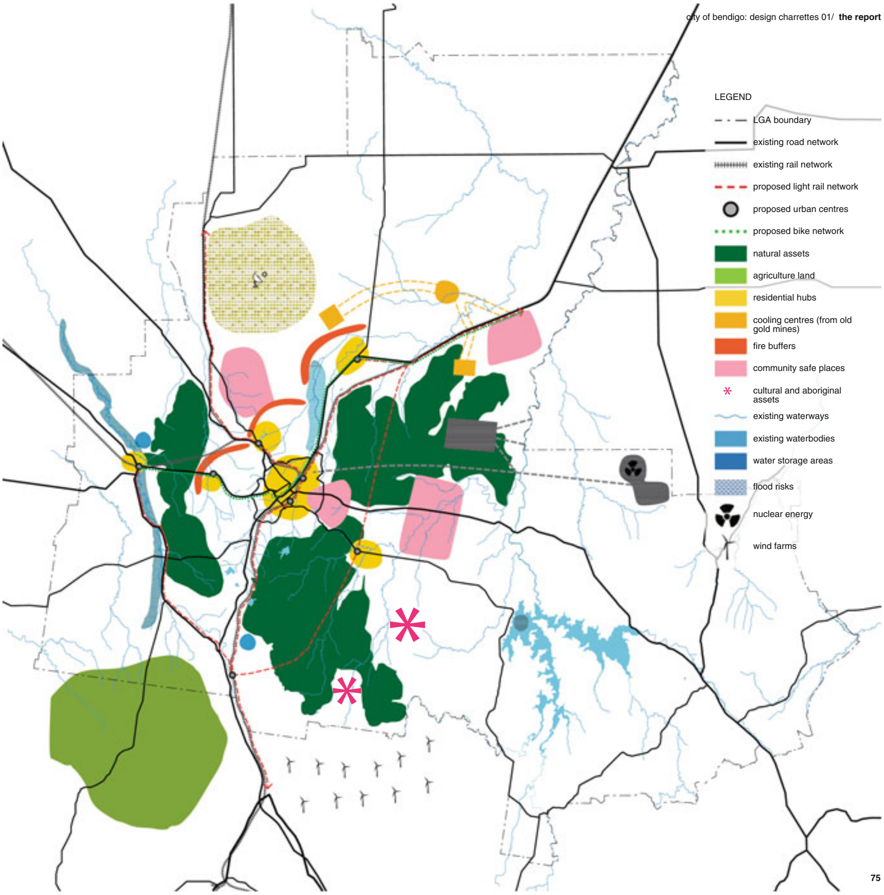

Fig. 6.15 If you can't stand the heat …

area with one high-rise building: the Bendigo Residential Tower, a light-rail system connects urban centres and intense bike networks are proposed.

A concentration of parabolic dishes, several solar farms and hydro power plant at Lake Eppalock are seen as the main renewable energy resources. The abundance of natural reserves, aboriginal heritage sites and a fruit bowl are projected outside urban areas (Fig. 6.16).

6.6.6 Sea Lake: General Outcomes

The Sea Lake economy, based on grain production is fragile. A focus on producing grain only could well prove the wrong strategy for the future. The Sea Lake

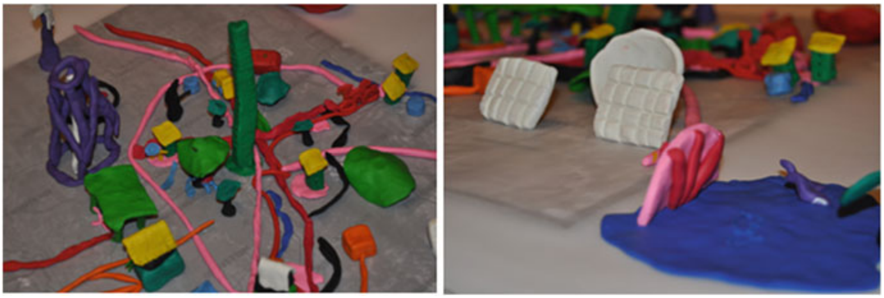

Fig. 6.16 Plasticine impressions

charrette resulted in a spatial long-term framework in which a broader spectrum of options were discussed:

- Innovate current farming: The newest technology allows farmers to organise their production process remotely and as managers of vertical integrated farms. A range of new products and services can be added as the output of farming;
- Lock in natural wonders: The unique natural and cultural setting of Sea Lake allows for the development of special tourist attraction, such as star gazing at Lake Tyrrell, the development of Land-Art and a new arts precinct linked with the existing silos. This enhances a vibrant town centre, where galleries, shops, cafes and restaurants open and space is found for a planetarium, a museum and artists residencies. The silos themselves are used to project movies on and as a climbing wall;
- Unlock the science of geology and history: the area is full of geological and historical wonders. The history of the sea lakes is exciting and new scientific technologies can be discovered. The aboriginal heritage in the area is rich and can be an object of study in all its broadness;
- Advanced (agricultural) education: The existing strengths at Tyrrell College can be extended into an internationally recognised education program. The connectedness, both virtual as in exchanging students with the rest of the world belongs to the core of the 'Agricultural Centre of Excellence' in Sea Lake;
- Facilitate with accommodations: the development of Sea Lake as a vibrant town with a focus on tourism and education requires a range of quality accommodation. For visitors the accommodation ranges from simple RV-parks to farm stays and luxury lake edge lodges. Students, professionals and elderly need to be accommodated with accessible housing, which can range from yurts and tee pees to semi attached care units and large modern villas.

No matter how serious the climatic impacts may become, one thing became clear: "Leaving is no option". The framework that has been developed during the charrette illustrates that a small community can decide to be prepared for the future through diversifying its functionalities, facilities and services. The choice to shift its focus from farming only towards education, tourism and science shows the power of the community: it enables them to construct the right combination of activities at any desired moment. This will provide the income, the safety and the quality of living together.

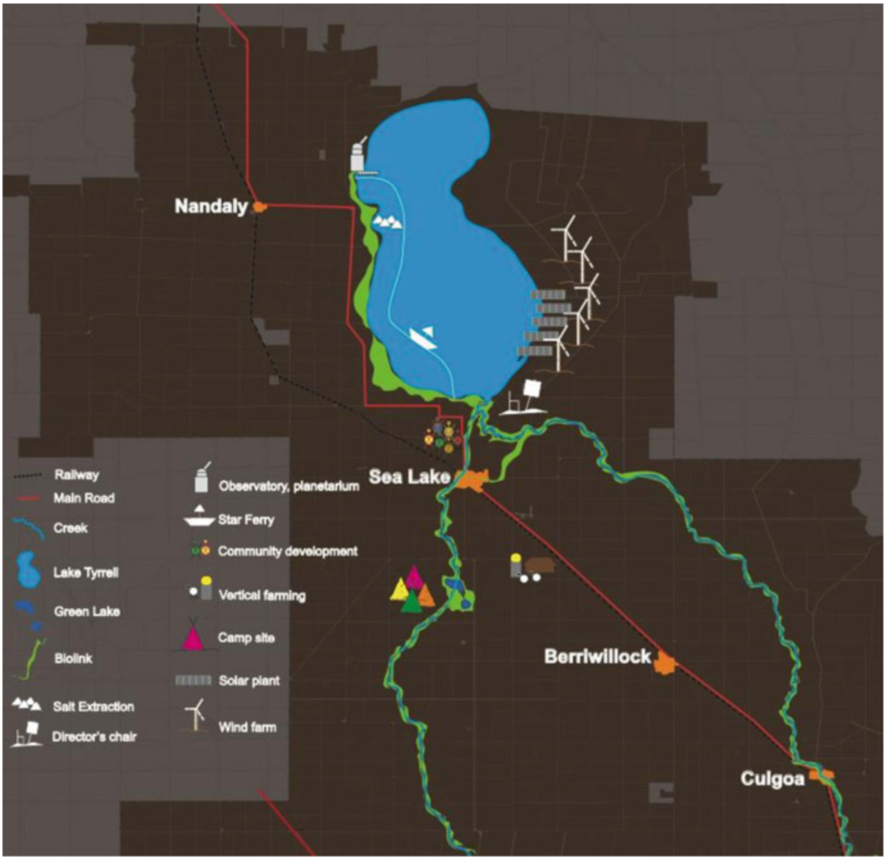

Fig. 6.17 'Development through Diversity'

Out of the wide variety of ideas developed during the charrette two integrated proposals illustrate the innovative character of ideas emerging from the local community: 'Development through Diversity' and 'Salt, Sky, Sun and Stars'.

6.6.7 "Development Through Diversity"

This design (Fig. 6.17) emphasises a range of investments and fields of attention are integrated to create a sustainable and climate proof future.

1. The salt lake, Lake Tyrrell is an underdeveloped natural beauty. The vast views over the lake in combination with nightly stargazing open immense tourism opportunities. A broad zone of enhanced ecological quality with human co-use is projected around the lake. This makes it possible to access the lake and create several

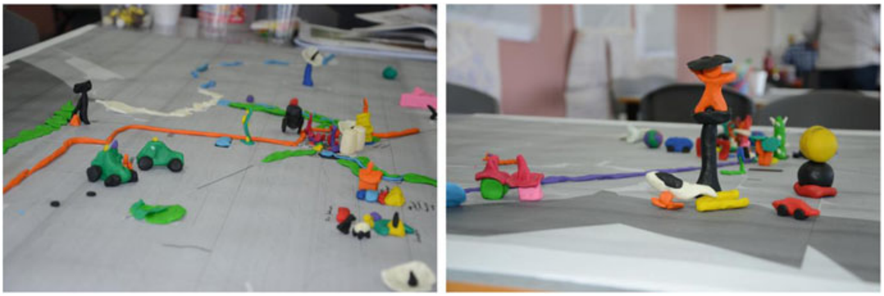

Fig. 6.18 Plasticine images

attractions along the shorelines. One of these attractions is an observatory with telescope, which is not only accessible by road, but also using a flat-bottom boat crossing the lake. At several spots around the lake temporary stages are build to perform opera under the stars. This could develop in a summer festival of lounge-listening opera, while gazing at the stars. Additional bio-links are proposed to connect the lake with creeks in the surroundings. Additionally, wind farms and a solar plant are developed at the eastern edge of the lake. It remains possible to extract salt;
2. The balance between biodiversity and farming is preserved. Both the efficiency of farming as well as the functionality of ecological corridors is important. Combining integrated knowledge about extreme weather events, such as long droughts, sudden floods and locusts with leadership enhances immediate responses;
3. Farming becomes more holistic. It twins the goals of plain efficient agricultural production with activities that go beyond basic farming activities. This 'vertical integration' of activities, such as poultry farming, intensive agriculture (pigs) as well as marketing, virtual selling, ownership over machinery and transport means requires a critical mass of engaged people;
4. In order to support farmers in temporary difficult times an innovation centre develops appropriate governance arrangements to provide labour and/or capital on ad-hoc basis;
5. The (underestimated) potential of Green Lake is (re)developed. The water problem will be solved and a new, state of the art, campsite is projected.
6. Appropriate cultural support, such as language classes and education for families and children with an Asian background is essential to attract Asian families. A multicultural community, in which locals also learn Asian languages, emerges and improves understanding and coherence amongst all inhabitants of Sea Lake (Fig. 6.18).

6.6.8 'Salt, Sky, Sun and Stars'

The design (Fig. 6.19) makes optimal use of the natural qualities of Sea Lake and around. The specific qualities of Lake Tyrrell are taken as the starting point for the proposal to develop the area for sustainable tourism. Apart from the general aim to

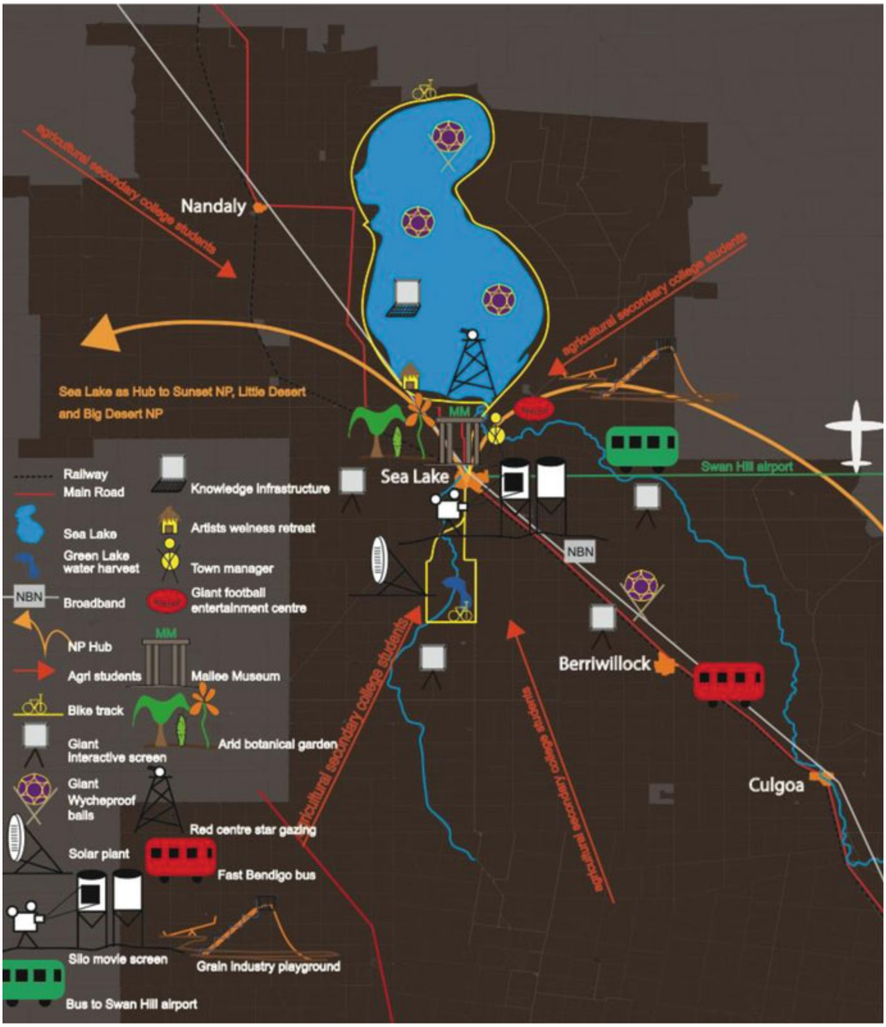

Fig. 6.19 ‘Salt, Sky, Sun and Stars’

make the area more sustainable, the focus lies on the crisp and clear skies, archaeology, indigenous heritage and art.

1. Sky and science. The skies offer the opportunity to develop astronomical science and stargazing activities. The dunes and salt lakes, and facts such as the shoreline that used to be at Swan Hill, are interesting archaeological finds. The many cultural heritages of aboriginal origin complete the scientific interest in the area;
2. Art. An art exhibition in Lake Tyrrell consisting of huge coloured steel balls, made by an artist in Wycheproof, suddenly appearing overnight in the lake, gives Sea Lake the same mystical reputation as the grain circles do in remote areas of

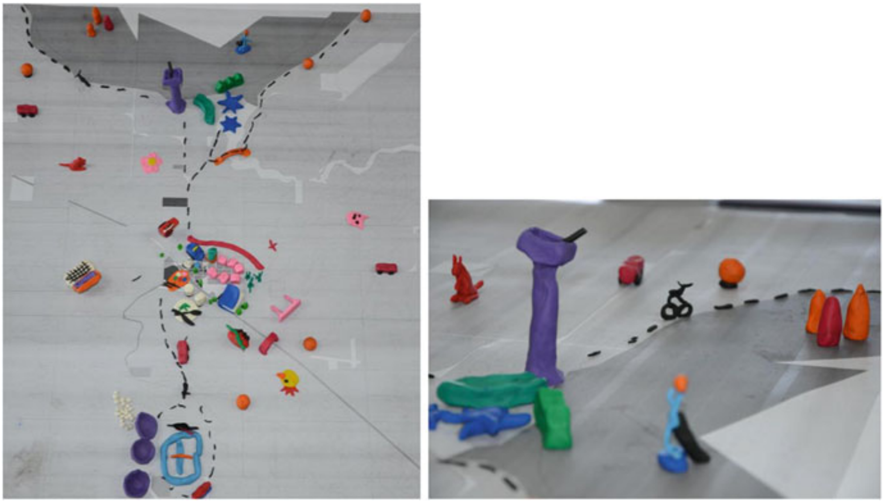

Fig. 6.20 Plasticine modelling

the U.S. The lake's shore is an excellent location for an artists and/or writers retreat and further buildings in the town are painted with artwork;

3. Accommodation and facilities are required to cater for scientists and artist coming to visit Sea Lake. They form a part of the farm experience and are built in a sustainable way;
4. Educational tourism. Young people will be interested to come to Sea Lake to learn and study about culture, art and astronomy. Subsequently, this would generate a broader scientific interest for the salt lake in general and Lake Tyrrell specifically. Students, academics and interested local people could jointly conduct research. The existing educational programs, school camps and agricultural learning lines of Tyrrell College provide the connection between local assets and the wider world. A sustainable relationship can be developed between nature, science and other activities, such as cycling (bike races) and hiking along or around the Lake;
5. Long term integrated sustainability enhances the quality of the environment, the care for natural resources such as water and energy and is connected with demographic and economic prosperity, which provides work, increases facilities and the number of people, visiting or living in Sea Lake. A critical mass is reached and sustainably maintained, because it is not solely dependent on farming;
6. The focus on the assets Lake Tyrrel brings to the region, and exploiting those, in combination with a thorough understanding of sustainability gives Sea Lake a position as the HUB to other towns and regions in north-western Victoria, such as Little Desert, Big Desert and Sunset National Parks.
7. A strong communication strategy creates attention for the qualities that are already locally experienced. These qualities must be accessible, visible, real time and virtual (Fig. 6.20).

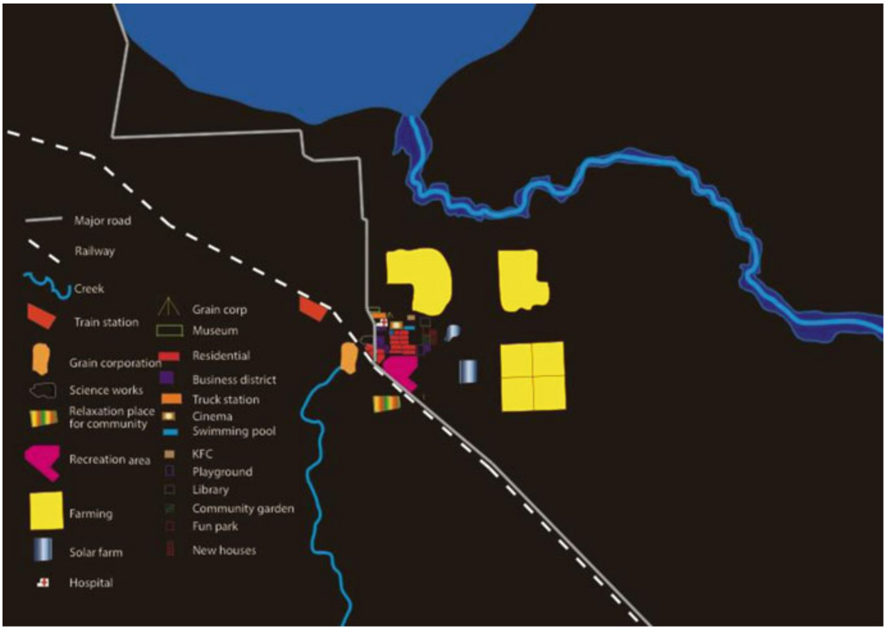

Fig. 6.21 'Our New View' (By Anouk, Belle, Michelle)

6.6.9 Children Results

The results of the children's charrette are diverse, sometimes unrealistic, but always refreshing and unconventional. The literally comments and writings of the children are reproduced in this section (Fig. 6.21).

Anouk, Belle and Michelle: "Sea Lake has grown in size and there is more space for farming and living. There is better education and more places for children (young and old) to play and relax. The Wind Farm and Solar Farm provide natural and environmentally friendly energy. Places like Science Works and the library provide great education for kids outside of school. The wider range of shops allows citizens to choose between wants and needs. There are more farms, which provide more food and being more houses there means more people can live in Sea Lake. Sea Lake should realise our ideas because it will be better for the community and growing children" (Fig. 6.22).

Anouk, Belle and Michelle again: "The colours mean all different things: Purple is shops, Red stands for houses, the Pink is education and Blue is water. The yellow is farming with a lot of animals and the green is a garden. We thought about a relaxation place, where people could relax. We also want to produce energy for the future and so save money. We want to build lots of wind farms. We further thought of exercise, so we needed a gym and we also wanted a fair bit of new things. Orange means transport. We want to have the station and also the traffic station. Out there is

Fig. 6.22 Plasticine model of 'Our New View'

the train station that will have a train up to Green Lake. Many of the new things are shops, such as the Target and a Woolleys. We also like to have a cinema and a bakery and a KFC and a McDonalds. Further we thought of a fun park and a science works with the lab bottles. Then we plan an elderly centre and a retirement village with easy access. And new tennis courts and netball courts, a bowling green and a golf course" (Fig. 6.23a).

Micha, Dean, Scott and Lewis: "There's a farm, around here. There's a hotel. And there's a prison. There is a petrol station and here is a gold mine (you need to pay for it). We have a hospital and here are pubs near the casino. Here's the cemetery. We have a fun store and gangster world. Here's the Dick Smith and the fun store. Here's the race course and the cinema and we have the football oval" (Fig. 6.23b).

Inez: "Our imaginary Sea Lake is very interesting. From the rainbow slide with a pot of gold to the UFO shop and landing space, our fantasy took off. Of course we would not suspect that these plans would come in action, but maybe in the future we would learn how to make UFO's".

Charlotte: "Our imaginary Sea Lake is weird. We might not see everything to come true. It will get bigger though. We most likely will not get rainbow-slides or UFO landing sites, not even cactus land. I hope something comes into action".

Kate: "Our imaginary Sea Lake is awesome. We might get a pet shop, but probably NOT a UFO landing spot. It would be great to have it all".

Heidi: "Our imaginary Sea Lake is very cool. We would like lots of things to go in our town but we probably won't get all of them. I would like a cinema and a sports stadium but we might not get it".

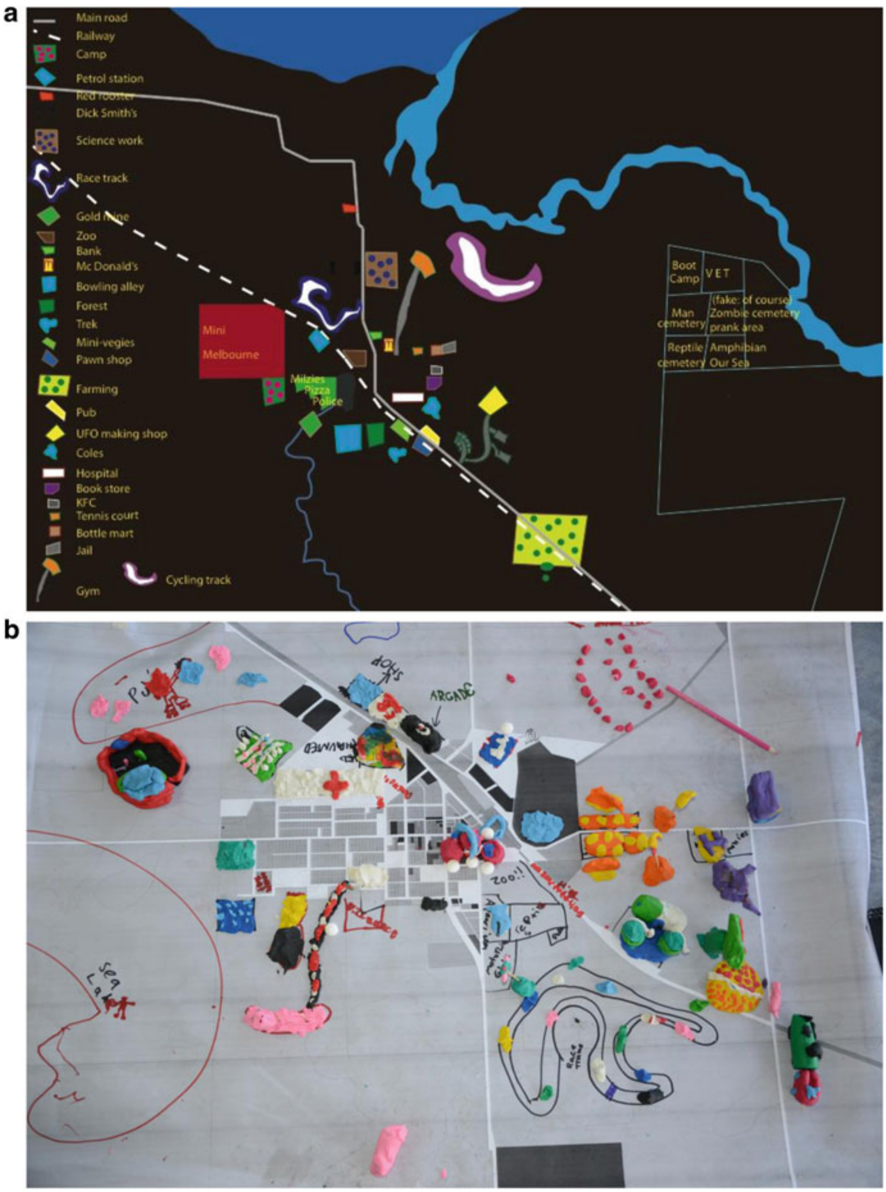

Fig. 6.23 Our Sea Lake (by Micha, Dean, Scott, Lewis)

Brooke: "Our imaginary Sea Lake (Fig. 6.24) is pretty cool but we probably won't get many. Many things are quite interesting, but like I said we probably won't get much things. It would be nice to get some" (Fig. 6.25).

Inez, Charlotte, Kate, Heidi and Brooke: "We did a huge national park, with the flags and a cafe and a Woollies. There is a giant TV screen and a cinema. Here's the

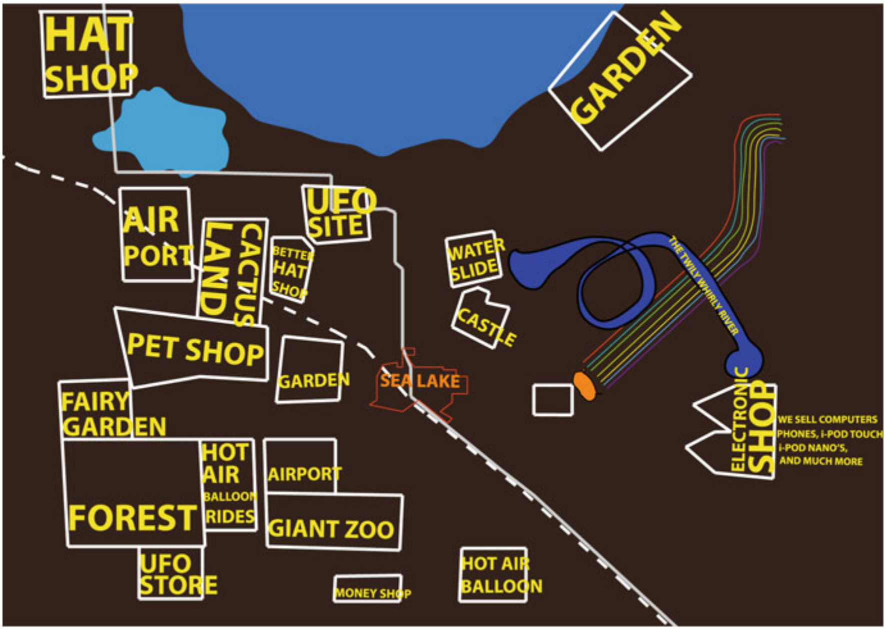

Fig. 6.24 Our Imaginary Sea Lake (Inez, Charlotte, Kate, Heidi and Brooke)

Fig. 6.25 Plasticine model of Our Imaginary Sea Lake

Pizza-maker next to the leaning tower of smiley faces. There's the hospital, there's the science works. The outdoor swimming pool and the indoor swimming pool are here. Here's the pizza restaurant, the dairy factory, the zoo, the car shop, the gym and the hotel. The giant cake maker, the cafe and restaurant are here. The petrol station, the bakery, the theme park, the target, the motel and this is the butcher, and the K-mart. And there's the sushi shop, the University and a boat rental shop. We've got a school and a high school, a museum and a sport club. The giant radio is over here and a library so everyone can read. Here's the fire station and there is an ice-skating ring and an aquarium. And a pizza place and we got a Myers and a caravan park, and a car park. We've got houses, a bicycle shop and an insurance company. We've got a waterslide, which is nowhere near water. There is a sports stadium and a lot of animals, all in Melbourne National Park, with an elephant, a snake, a giraffe and a tiger, and a head of something. And a crab, but that's washed away. And we have a pizza place, but I already said that".

6.7 Sea Lake and Bendigo: The Advantages

The two case studies of Bendigo and Sea Lake, both executed in the specific Victorian, Australian context, illuminated the following advantages:

1. Relation with existing planning processes. Both design charrettes provided the answer to a specific question that has been raised in a regular planning process: the review of the Residential Strategy in Bendigo and the update of the Sea Lake Community Plan;
2. When the execution of a design charrette is offered for free, it can happen that council doesn't see the outcomes as very valuable. Especially when the agenda is overloaded and priorities must be set, the projects that are heavily invested in gain higher priorities. In Sea Lake the design charrette came at no cost for the community and was warmly welcomed, which proves that this is not always the case;
3. A design charrette is more successful when at the start of the process commitment at a high level within the organisation is arranged. When for instance the mayor or councillor supports the design charrette, support in the rest of the organisation is easier. A good example of commitment was shown in the Sea Lake case where active involvement of the CEO and an active individual commitment of council and the Advance Sea Lake group led to participation of different councillors and the Mayor in the design charrettes;
4. Active involvement of stakeholders can make or break a successful design charrette. The stakeholders from the community, as in the Bendigo charrette, contributed valuable knowledge, creativity and experience to the process. Committed collaboration happened also in Sea Lake where the Advance Sea Lake Inc. not only participated in the charrettes, but also collaborated in the preparation and evaluation of the program and results of the design charrettes;
5. The duration of the charrette is a sensitive point. As demonstrated in literature, a design charrette takes between 4 and 7 days (Condon 2008; Lennertz and

	Individual or collective learning	Nature of learning domain	Kolb experimental learning cycle	Depth of learning impact
Distributive	Individual	Tame problems Technical challenges	Conceptualisa-tion only	First level learning
Interactive	Individual	Tame problems Technical challenges	Conceptualisa-tion and experimenting with new behaviour	First or second learning level
Collaborative	Collective and individual	Wicked problems Adaptive challenges	All stages of cycle (and multiple times)	Third learning level

Fig. 6.26 The Victorian design charrettes positioned in the learning framework

Lutzenhiser 2006). In the two cases this type of time-consuming process has been proven too ambitious. More than 2 days taken out of a working week for a design charrettes was in the two case studies in Bendigo and Sea Lake not possible. Therefore, the design charrette in Bendigo was condensed into 2 days and the Sea Lake charrette lasted one and a half day (Friday afternoon and Saturday).

In the two design charrette case studies a collective learning process has taken place. The problems at stake were complex and interrelated, where questions were asked about how integrated adaptive challenges could be tackled. This caused a rich exchange of ideas and experiences, led to shared reflections and challenged individual values and beliefs. All participants learnt new things and went through the iterative process of collective problem definition and problem solving. This can be categorised as third level learning (Fig. 6.26).

6.8 Place in Charrette Wheel

The two design charrettes in Bendigo and Sea Lake both took place in Victoria, belonging to the developed part of the World and focused on the regional level of the entire council, in which many peri-urban issues were prevalent (Bendigo) and the typical rural community of Sea Lake. The complex problems were interrelated

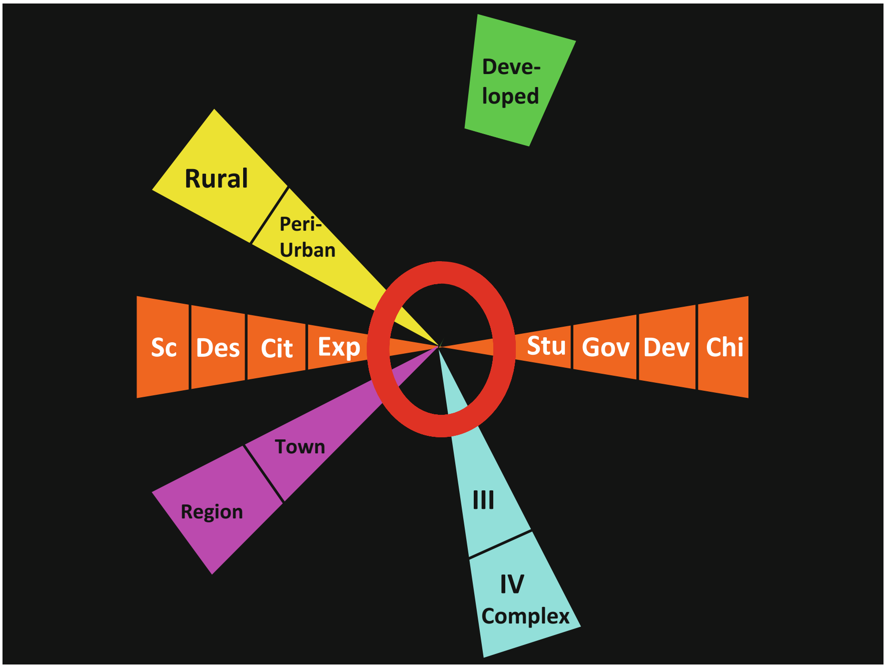

Fig. 6.27 The Victorian charrette wheel

and seen and discussed as an integrated set of issues in a complex context changing under influence of climate change, economic and demographic factors. The charrette in Sea Lake looked at the town and its surroundings while the Bendigo charrette took the entire region into account. Finally a wide range of participants took part in both charrettes: Scientists, Designers, Citizens, Local Experts, Students and Government. Industry partners were part of the Bendigo charrette while children enriched the Sea Lake event (Fig. 6.27).

6.9 Conclusion

In conclusion, some remarks can be made regarding the successes and constraints in organising design charrettes to support local regional communities to plan for climate adaptation.

1. Offering the design charrettes free of charge can position the charrette at a lower priority within the local council agenda;
2. When the design charrette is connected to a concrete actual question in council the design charrette will gain more traction and this leads to better focus in the charrette and more committed participation;

3. Gaining support in the beginning of the process is important to develop a successful design charrette. When the charrette is supported by the Mayor, Councillors or CEO of the council others will feel obliged to contribute to the process;
4. It is important to connect with local stakeholders, as they are the source of much inside information and local knowledge. It is their future they focus on during the charrette, implying intrinsic motivation and they prove a great support in focusing the content and organising the practical aspects of a charrette;
5. It is preferential to condense the charrette in 2 days. Many people are too busy to spare more than 2 days and the two case studies in Victoria have proven that in 2 days extraordinary and valuable results can be delivered.

Derived from the design charrettes in Bendigo and Sea Lake it is advisable to take these 'golden rules' into account at the start of organising or proposing a design charrette.

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Chapter 7
Lok Jumbish: Rural Participatory Design in Rajasthan, Lessons for the Future

Virajita Singh and Sanjay Prakash

7.1 Introduction

In this chapter, a participative design process involving design charrettes for planning sustainable schools in rural communities of western India is discussed. In the early 1990s in the State of Rajasthan, a remarkably ambitious project was launched. It sought to address the need for education in rural communities in a region that trailed in literacy and educational achievement. Called *Lok Jumbish* (translated from Hindi-Urdu as "People's Awakening"), it aimed to provide 'Education For All' in the educationally backward state of Rajasthan.

One aspect of the project was a plan to address the need for sustainable buildings infrastructure and support the overall goal by designing and building primary schools. This chapter reflects on the context, details, impact and lessons learned from a successful participatory design process implemented in Kishanganj Block, Baran District. It is written as a dialogue between Sanjay Prakash, one of three lead New Delhi architects selected to pilot the work on the ground in different parts of Rajasthan, and Virajita Singh who was project architect on Sanjay's team from 1993 to 1996.

The need to better understand and implement sound processes of participatory design, including design charrettes, continues to grow in our times. This chapter will end concluding the advantages of design charrettes to involve rural communities in the design of their buildings and infrastructure and the lessons learned, which can be applied to other rural communities in India and beyond.

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7.2 Education for All

Virajita: The Lok Jumbish project had a unique vision in many ways. Started by visionary retired government officials from the Government of Rajasthan such as Anil Bordia, P.K. Lauria and others, it had an ambitious goal of educating every last child in a state with some of the lowest literacy levels in India. The pilot phase hired three architectural teams, of which our team was one. The first unique aspect of the project was that it marked an organic way, in which the project approached development, to set up a prototype if you will, and allow for the learning that came from the pilot phase to shape future development. The second unique aspect included recognizing that the Buildings Development Programme was an essential yet small part of the goal of education to be reached keeping in mind the ancient traditional nature of education in India – where a guru taught students under the shade of a tree…. The third unique aspect was the focus on participation from the beginning not only in meeting the educational planning goals but also in the design and construction of buildings.

I came into the picture when the process was already underway. What drew you to take on the project, particularly from the perspective of participation?

Sanjay: Among the projects I had worked on by that time (early 1990s), the most challenging and satisfying ones had exhibited a complexity born out of multiple authors – where many users and specialists contributed their design ideas that needed to be harmonized by a "chief", though sometimes the ideas self-emerged as in a living process. Projects like Mirambika (a free progress school in Delhi), for instance, drew upon similar work being carried out in parallel in Europe by Hungarian-born French architect Yona Freidman and Belgian architect Lucien Kroll. Therefore, when Mr. Bordia briefed me about this project I was extremely keen to develop the idea of authentic participation in rural India, where culturally there was, and is, a lot of subterfuge forced upon communities in the name of participation. The project was to be funded by the Swedish International Development Agency, the Government of India, and the Government of Rajasthan in a 3:2:1 ratio, and not more than 25 % of the funds were to be used in Buildings Development, but the amounts were still large enough to seem feasible to cover all 40,000 villages of Rajasthan in a phased manner. Mr. Bordia initially suggested to me that I start a non-profit to do this work but we took on the work under our regular architectural consulting office DAAT (Design Architecture and Associated Technologies), since I held the opinion that even a profit-making firm could do socially-relevant work if it was built into the contract. As it turned out, I was wrong, since the project could not be completed on time (see below) and we lost money in keeping our commitments.

7.3 The Context and the Problem

Virajita: Taking on the question of buildings on this project was a huge task. The state of school infrastructure in Rajasthan was rather dismal. Proper building construction practices were lacking, and often corruption in village government led to deviation in standard construction practice – for example, the right quality of materials weren't used and there was also the case of a lack of resources as in the case of proper use of water for curing concrete in an area where water resources were scarce. One of the striking images I have from that time is of a one-room school with crumbling walls and no roof and the teachers and students working outdoors exposed to the elements. Colonial and top-down models of design and construction were prevalent. For example, typically school designs were created as 'public' buildings with a colonnaded veranda in the front. These were produced in New Delhi, the country's capital, and then passed on to local village governments to implement with obvious no response to place and microclimate. Vernacular practices rooted in climate and place were being ignored – it was a tough context. My architectural education and practice thus far had not prepared me for the complexity of the situation. And yet, the effort that sought to change the status quo for the better and engagement of users in the process was incredibly exciting.

Sanjay: In addition to all of this, the school-house often consisted of an uncreative "train" of rooms in any arbitrary orientation, exposed to the elements and not forming useful open space. In what was a state with the best building craftsmen of India, the previous schoolhouses were nothing but concrete matchboxes that bypassed the local skills of building craftsmen, ignored climatic conditions and site resources, and were quite learner-unfriendly. They mainly suited the engineers and the contractors who designed and managed the processes of these kinds of engineered building. Much of these designs had been evolved during a 1960s scheme 'Operation Blackboard', which had created masses of buildings so poorly designed and built that many of the buildings, in various states of disrepair, were not used by the villagers to even house their animals!

Virajita: It was eye opening for me to see the conditions in which people lived their lives in Kishanganj. There was minimal infrastructure – in many situations having a toilet in or near the home or school was a special thing and people routinely walked for miles over rugged terrain as a means of transportation. Still, life in those rural communities was much safer and less harsh than being in a slum in a metropolis like Mumbai or New Delhi. And I also noticed the richness of a living culture, language (dialects), and traditions. People lived by the land and seemed connected to it.

Sanjay: The thing about the social situation of these communities, which made our task simpler, was that by the early 1990s they had mostly accepted the advantages of education, no matter how poorly it was delivered by the government school system. Unfortunately, most parents' ambition for a child was to get an unproductive but paying clerical job in the government after a degree, with security of employment. Even if for the wrong reason, parents from all walks of rural life were trying to send their children to school. Expectations had also changed over time. No one in the 1990s bought the cop-out idea of sitting and learning under a tree, with all its attendant dust and rain issues.

I think the area, which was a major challenge was that girl-children were still not considered children worthy of education! Parents would count off their sons when I would ask them how many children they had (it is so deep rooted that the collective noun for 'children' in Hindi – *bacche*, can also be applied exclusively to male-children,

Fig. 7.1 Integration a multi-disciplinary team

since female children are *bacchis*). But rather than look down at these perceptions, we tried in the early days to understand the logic behind them. Only by understanding them as a user group whom we as architects were serving did we get an insight about what needed to be done.

The other issue that is often missed by one-discipline programmes such as ours is that as educated professionals from an outside context, we could not consider our task 'just' to design and make buildings – we had to be bare-feet infrastructure experts, news interpreters of news and culture, estimators, and sometimes doctors as well… (Fig. 7.1).

7.4 Shifting the Paradigm

Virajita: That explains one of the reasons why it was so rewarding for us to be involved in the work. We were expanding beyond the confines of our professional disciplines of architecture and engineering and entering a more holistic zone… The real opportunity was to shift the paradigm but the question was how. The client group was shifting the paradigm in the field of education – for example, they were engaged in hiring college and high-school students to teach at elementary levels in order to address the great need for teachers. They were also hiring and training young people with partial literacy skills in the villages to become bare-feet teachers, or teaching assistants (*Shiksha Karmis*) at a stipend which, given that they could be trained in camps by the best educators in the world, allowed the organization to bypass the lethargy that creeps in amongst certified degree-holding teachers, who cannot be dislodged from their jobs. It was clear both from the client's brief and our natural approach to design in DAAT that participation was the key. Education and raising awareness of people to value their own cultural heritage and traditional building practices was important even as we introduced new practices and goals. We needed a structure to help achieve this. We also needed new models and new processes. We started with the idea of engaging the villagers, many of whom were parents whose children went to the school, in the process of designing and constructing the school buildings. This had not been done before – typically there is a distinct separation between the government who is seen as provider of infrastructure and the citizens who use the infrastructure. The radical approach was to connect these two worlds with the idea that if people are engaged in the process of creation and construction they would have a strong sense of ownership and be more interested in the quality of the buildings and their maintenance.

Sanjay: The idea that village communities can design for themselves is not a new one. After all, village communities traditionally organised their own infrastructure. But the idea that participation is necessary *and* sufficient can be taken too far. I feel it was important for us, as trained technical outsiders to embed ourselves in the community (which we did, for over 5 years) but gentle challenging of traditional wisdom was necessary to counter practices that had simply become superstitious. What were the areas that the village community needed inputs from 'outsiders' like us? These tended to be technical issues such as the creation of earthquake-resisting concrete bands, which the villagers agreed to do only grudgingly, or the community's over-emphasis on initial capital cost, where the villages often saw no value in investing something for life cycle cost benefits. Still, as long as these issues were numerically small, the consensus on what was to be designed came up rapidly.

Thinkers as diverse as Indian visionary and philosopher Sri Aurobindo and Austrian-born architect Christopher Alexander investigated the process of deep collaboration. Whereas the former worked with a deeply intuitive inner process, the latter tried to convert the process into a 'pattern language' using which one would be able to make 'legible' spaces. I can only comment, through deep experience, that both the right-brained (Sri Aurobindo) and the more left-brained (Christopher Alexander) processes are integral to a workable solution. And this also means that while using such processes, tribal village societies, with their simple political relationships and living in an environment of relative abundance, are far easier to work with than highly politicised, urban disadvantaged communities, who are embedded in an environment of scarcity. This is something I feel in retrospect.

Virajita: These are wonderful insights. Across cultures, thinkers and professionals have been trying to find ways to tap natural processes for human action and such processes and frameworks are important. Speaking of frameworks, we developed a Base Paper on Proposed Norms as a framework for our work, which set up some standards. It covered *demographic norms* related to overall enrolment and types of schools required. *Space norms* were also developed deriving spatial requirements from estimated enrolment. Then there were *functional performance standards* that the buildings needed to exhibit and finally there were *construction norms* that were to be adopted across the project.

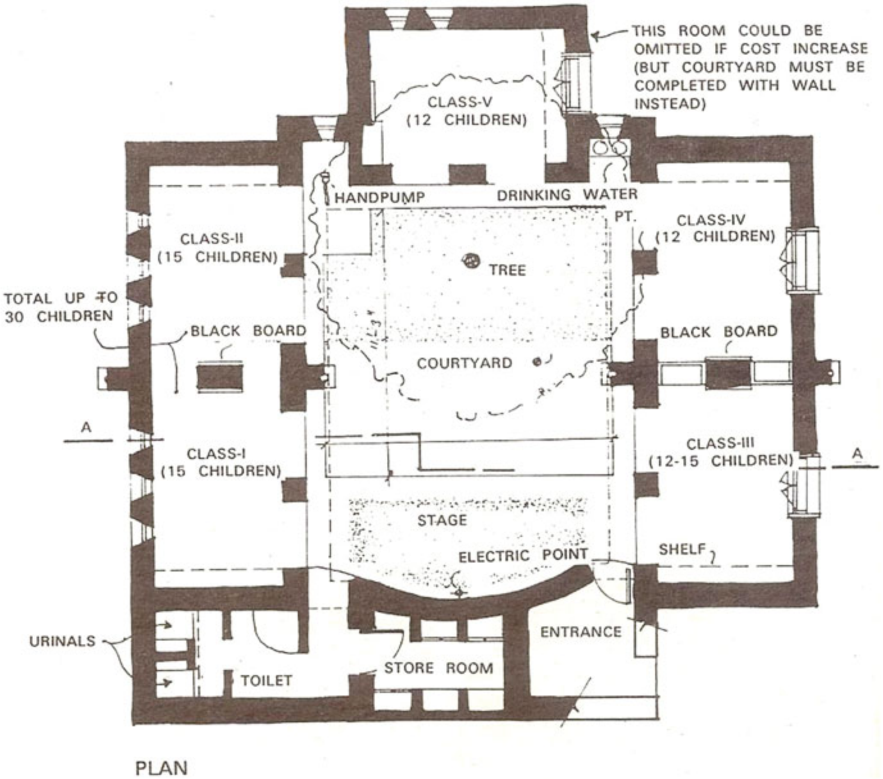

Fig. 7.2 Map of the collaborative designed courtyard village school

Sanjay: I see these norms as simply an integral outcome of a systematic way of working. It took some time before the village communities, formed into Building Construction Committees (Bhavan Nirman Samitis), understood that *they* were in control, that we would not draw a plan for a school or draw up a cost estimate unless they (often) made a Styrofoam model and broadly discussed the bills of material for the same. Once that realisation came, out went the long "train" layout, and in came the wonderfully intimate courtyard village school. A school where we strung three classroom spaces creatively so as to form a fourth "free" space: a courtyard, was seen as quite an innovation (Fig. 7.2). We even managed to set a protocol in motion where the covered area of a project was not counted just as roof and wall covered spaces, but had additional weights for verandas, pavilions, and courtyards. It also meant that we were no longer operating in the 'formal' economy set up by the 'fat' government systems, but in the 'lean' village economy, where good quality and durability could be obtained at 20–30 % less outlay than usual government estimates.

The village communities even proposed a non-standard (half size) classroom in villages where the total population was less than a thousand and there were unlikely to be more than 20 children in any form. What also happened was that any leftover money was used in investing in girls' urinals (a much neglected area of infrastructure in the villages), rainfall harvesting tanks, etc.

After about a year of fieldwork, all these norms were boiled down to easy to remember thumb-rules for village communities, within a backdrop of sustainability:

- Exclude Rain – no roof leakage, this calls for honesty in construction
- Collect Water – monsoon runoff from roofs for washing and drinking in summer
- Reduce Dust – by having an externally closed building with an open court and many plants
- Reduce Heat – through thermal mass (local sandstone slabs covered with earthen insulation and rubble construction)
- Reduce Cold – in the winter with south windows wherever possible
- Provide daylight – with daylight shelves in sandstone
- Use local materials and skills – (stone rubble, sandstone, sand, lime)
- Reduce high energy or non-local materials and skills (bricks, steel and cement).

7.5 Developing the Charrettes

Virajita: The charrettes we developed were powerful mechanisms to change the paradigm. They were over 2 days long and attended by villagers gathered from neighbouring villages where new or remodelled schools were being planned. We often started with a cultural program the evening before – this worked well not only to create a sense of community but also to honour the rich and diverse tradition of the music, dance and the theatre that each of these communities had – it was a kind of celebration, wasn't it? The next day had a morning session with education and conversation with the participants about design checklists and building construction methods. The afternoon session post-lunch had design sessions with the committees from different villages, about six villages clustered together at a time (Fig. 7.3).

Sanjay: The overall planning and delivery of the charrette was a team process with our non-profit organization partners from the field (a local NGO identified by the client from Jaipur, and who were our social mobilisation partners), our in-house team of field architects and engineers, the village Building Construction Committee from the host village and about five other villages. Meals were cooked and served on site. The teams from the neighbouring villages were accommodated in the village where the charrette was hosted. It is significant to note that quite a few of our teammates picked up the local dialect and could communicate well with the villagers. We also built up a hand puppet routine which was operated by the DAAT team that told, amongst others, "the story of the story of the lost roof slabs", with the school headmaster going to the innocent village headman to report the loss of the sandstone pieces, overheard by the corrupt wife of the headman who had 'borrowed' a few pieces of the school roof to use to build a roof for her cows. This form

Fig. 7.3 Committee design session

Fig. 7.4 Hand-puppet play

of satire is very useful as it is able to convey unpalatable home truths – imagine the guffaw by the actual village headman in the audience when he watched this scene! And yet, could he blame the player, the puppeteer for exposing his deception? Not really, he could at best get angry with the character, the puppet who was going though all these events, and how can one hold a grudge against a puppet (Fig. 7.4)?

7.6 Participatory Design Process

Virajita: The participatory design process started with explaining the steps ahead. We had drawn up site maps before the charrette and they were used during the discussion. The teams from each village were very familiar with the site under consideration. In some cases, a completely new school was being planned. In other cases, the school was being developed as an addition to existing room or two that would be repaired and updated.

The modules for room sizes and layouts were introduced in the morning session. We started the afternoon session with a conversation about the needs and program of the school to be proposed. To make it easy to create a design in three-dimensions, we used Styrofoam sheets that were pre-marked with grids of 1′ by 1′ to a ½″ scale, that could be quickly cut to proportionately size lengths and widths of walls, floors and ceilings by the participants using cutting blades. Doors and windows were easily cut out from the walls at appropriate locations. Tack pins were used to 'pin' the walls, floors and ceilings together to create a building with courtyard and site. Trees made of the same Styrofoam material could be quickly inserted as well (Figs. 7.5 and 7.6).

The Styrofoam modelling technique was good for tribal villagers otherwise not used to communicating verbally in an unfamiliar language (formal Hindi) to express themselves. Especially the women, who could often express through modelling, what an innate modesty prevented them from articulating it otherwise.

The teams developed the layout in conversation with each other about their village needs and site issues with input from the facilitators. Another breakout group

Fig. 7.5 Working with prefab Styrofoam materials

Fig. 7.6 Women participating in the modelling

would often discuss the construction, management and costs. Once the workshop was over the models and designs were photographed and documented, the designs were translated into a set of drawings and estimates to be submitted to the Lok Jumbish Office in Jaipur for funds to be sanctioned to be transferred to the village building committee for construction. The notion of architect/designer as facilitator emerged in this process, in my view. I have continued to notice since this project over the last decades, that the notion of architect as the prime creator has shifted, yet few design projects engage buildings users more fully in the design process as we tried to do in this project. It is still a rare occurrence.

Sanjay: Though no two schools are identical, once there were a few examples underway, the *vocabulary* of the architecture was pretty much the same. And this consisted of age-old materials that the village economy was able to provide abundantly: rubble, sand, lime, and sandstone (this last one from a market somewhat further away). There was occasional talk in the charrettes about making schools in the way they are made in the cities – with red bricks, concrete slabs, etc., but we were able to make the village communities see the sense of working in their own way because:

- The materials and skills were available locally;
- They could be made better, at a lower cost, and repaired locally;
- It required much less water and transportation than concrete roofs did;
- It was authentic, with supply chains already in place;
- It had a longer life than concrete buildings. This argument was disbelievingly received but the more educated among the community saw the sense in it, citing how ancient forts and palaces outlive modern concrete buildings.

I should mention that one of our architects, who was an occasional visitor to the field, got very upset about the charrette process, believing that it somehow demeaned the specialised knowledge of the architect, or did not create aesthetically acceptable output, or depended upon the charrette organisers to create the correct environment for a truly participatory experience and not one where village communities were led astray in the name of participation. I thought about these issues, and they are all correct, yet I do not think that we were 'demeaning' our profession by interacting with village communities, the aesthetic aspect was anyway up to the villagers to judge, most of whom were beamingly proud of these schools, and not architecture magazine editors, and yes, the sensitivity of the charrette organisers *is* truly necessary to not hijack the process, but it cannot be written down in a job description! But these were by far not compelling enough reasons for me to even consider aborting the process.

7.7 Impact and Meaning

Virajita: It is true – the charrette process with communities brings up questions for professionals about their role and responsibilities and is fraught with complexities. Our design charrettes certainly had impact. Rural citizens were actively engaged in the design process and that allowed them to have a sense of ownership in the process and the outcome. As a young professional trained in an urban context, I realized through the process that professional architecture education was based on a single client approach and did not prepare us for this process of actively engaging users, and certainly very little was taught about the rural context. The experience was transformative for me particularly when I realized that that there was such wisdom in the people and in rural communities – when we ask people for their input they are available and ready to offer it. Still, there were a lot of challenges – it took tremendous amount of time and energy to engage people in a properly executed participatory process. The numbers targets were not often met as a result of increased time for participation and the issues that came up as a result. It involved educating people and engaging them in truly democratic processes, after decades, or perhaps generations, of being disempowered and having no voice. At times, it was slow-going and often uphill. I thought this project created a new model of how we might engage communities in creating the physical manifestation of their own future. What were your observations?

Sanjay: I think a word on the numbers of projects is useful to understand the operation. We worked over 5 years in the field, with a field team that varied from about two people to about ten at most. I joined the charrettes and (later) the site visits. The Lok Jumbish organization determined that we should cover about 65 villages per year over 3 years, so about 200 villages in all. In reality, we covered about 315, with the addition of the next block of the district, but our 'score' at the end of the first year was zero and even in the second year we were in the low double digits. Then the process really started setting in into the third year and

Fig. 7.7 The Cluster Research Centre, inside

it was only after the fourth year that the entire community-expert system was delivering over one school a week!

In retrospect, we could have saved a lot of angst (and money) had we accepted that such processes need time to set in; that village communities feel too cheated by urban contractors to trust them immediately, and that building construction in the villages itself is a free time activity, undertaken when there is no great demand for work in the farm, nor too much rain (which leaves rather a thin set of time windows for construction). Trying to push against any of these constraints with modern management or money power would have made the process fail.

As I mentioned earlier, participation is not the single-point solution to widespread community design outcomes, but it is certainly a great foundation to deliver buildings that are loved, well kept, and lived-in. Despite working within the village economy, however, our modest 315 village project did create some material shortages in the last year of the project, with village communities having to bid for the same lot of rubble, lime, sand or sandstone which had started becoming meagre.

Virajita: These are important lessons going forward in this kind of work. There are clear implications for environmental, economic and social sustainability.

Sanjay: At the request of Mr. Bordia, we undertook a women masons training programme. This was only a limited success, lasting only for the duration of the construction of the building on which they were trained – the Cluster Resource Centre, which at about $18' \times 27'$ created the largest span building in that part of the district, without using concrete (Figs. 7.7 and 7.8).

Once over, the women went back to household chores, and even when they helped in construction later, they reverted to their role of helpers, which is not just due to gender bias but due to the way that the woman's role is designated by these

Fig. 7.8 The Cluster Research Centre from the outside

Fig. 7.9 Women during training as masons

societies as homemaking, and being a mason demands focus that conflicts with that role. Still, they were all clearly proud of their new-found proficiency (Fig. 7.9).

The training of women as masons threw up some unforeseen problems, three of which bear mentioning:

- The women needed a crash (2-week) course in arithmetic to add and subtract feet an inches up to 20 in. to be able to interpret dimensions correctly. This was

Fig. 7.10 Women at work in their Rajasthani-style skirts

accomplished by the *shiksha karmis* mentioned before, who designed and executed an operational arithmetic course to become proficient at numbers up to 20, by getting them to walk in the bush while discussing arithmetic problems in a unique implementation of the Socratic method!

- Why could we not have used metric units, which are officially recognised in India? We discovered that all local masons were working in feet-inches, but more importantly, they were not familiar with the decimal system, and while reading centimetres and metres on a tape measure, for instance, the dimension 1 m and 1 cm (1.01 m) was quite easily confused with 1 m and 1 dm (1.1 m). In fact for most masons 1.1 and 1.01 were the same number (one of the larger unit and one of the smaller unit), and 1.5 m = 1.05 m = 1.005 m, which was never a problem in the feet-inch system, which slipped into halves. Therefore we decided to leave this as an agenda for the next generation.
- The women had to change their code from the Rajasthan-style open skirt (*ghagra*) to the Punjab-style trousers and shirt (*salwar kurta*) to not feel naked or be victims of ogling when they were squatting, working on a scaffolding 8 feet high! However, this was done without any social repercussions. In this case, money, in the form of an enhanced income, was the great leveller against social prejudice (Fig. 7.10).

7.8 Lessons for the Future

Virajita: This kind of work needs to be done around the world. We are at a time where people want more involvement in creating the systems they are part of and their future. Across the globe, North and South, the masses are reacting to what is not working for them and yet we have not devised practices that allow for community engagement at a large scale. In terms of sustainable development, there is a heightened awareness of human impact on climate change and the need to do things differently, yet we have not connected the dots in terms of the actual planning and development process of sustainable development and creating a sense of ownership between people, their buildings and the land in a way that people can be actual stewards of change and sources of action to nurture and regenerate the Earth instead of destroying it. I think it is possible to create ways that are socially, environmentally and economically benevolent – the Lok Jumbish Project was one important prototype for how things might be done. What might we identify as overall suggestions to other rural communities in India and beyond?

Sanjay: More than anything else, communities need to create a large consensus around what determines their quality of life, unaffected by media hype and noise.

Virajita: I agree. If we look back at the process, there are distinct responsibilities for each group (users, clients, professionals) involved in the process. We had the advantage of an enlightened client – one who deeply understood the essential importance of a participatory approach and upheld it through the process. In another situation, where the client does not have that perspective, there may need to be dialogue/education about it.

Sanjay: Actually, I believe clients will disappear and be replaced by users who are both producers and consumers. Clients exist in a world of corporations, where we delegate to them the responsibility to organize and produce complex industrial products, materials and services. The nature of the corporation itself will change with greater outsourcing, insourcing, and crowdsourcing. And the social responsibility of corporations will not be seen as an activity distinct from its primary activity of wealth creation, only its measure will be different.

Virajita: In terms of community participants, it helped that there was a larger process at work in terms of rural engaging communities in the question of creating their future, of possibilities for educating their children, of engaging women in the process of creating success for the next generation. It seemed to me that these were fundamental conversations that the larger Lok Jumbish project had taken on, that supported well the work we were trying to do in the area of buildings and infrastructure. In another rural community context without the larger framework, the overall question may need to be addressed in some way. It seems to me that in the work I do with rural communities in the United States, that there is already an expectation of engagement, although not so much may be at stake as in the case of the communities we worked with in Rajasthan. The issue of sustainability has to be presented differently based on each context. What should architects and other professionals keep in mind?

Sanjay: Within the context of the new millennium, I believe the corporation of the twentieth century will become extinct. We are progressing towards a world in which our collective and unique value systems will inform the design. The pursuit of opulence, needing to be maintained by ever-increasing resources, will be replaced by the creation of abundance. Less will do more. A small ecological footprint rather than wasteful consumption will create cooperation with nature. The attitude will be symbiotic rather than antibiotic, aiming for fulfilment rather than blind achievement. As designers, this is world we have work towards and operate in, simultaneously.

Virajita: This is a wonderful vision of the future. Perhaps on important lesson of the Lok Jumbish Project was that it put people first, true to its name, and infrastructure second. I was sorry to hear of Mr. Anil Bordia's passing recently in September 2012 but in reading his obituary in the news, I was struck by the fact that his focus in the many visionary projects he initiated including the Lok Jumbish project was to tap human potential and social capital. I think buildings and infrastructure should be seen as the means to an end rather than only ends in themselves. A building project can be a powerful driver for evolution of a community's awareness of itself and a ground for action for how life in a democracy might be lived, and should be fully used for that.

Sanjay: Don't you feel that all the time we get better off materially in our lives in this modern world we lose something of real value? That as we acquire refrigerators, air-conditioners and cars, we lose places for children to play and neighbours to lend us a cup of sugar or sit with us when we are not well? As we get better locks for our homes we are increasingly insecure. As we extend our life spans we are ever more reducing the quality of that life. As we have better roads and cars we waste yet more time in traffic jams. As we have more food to eat we grow unhealthy. And we get privacy for our nuclear families by losing friends and community.

Is there a way to change this? We must invent a way that would take us forward, to the future, not a regression to our past – a future where we would again engage with our humanity without giving up the creature comforts provided by modern life. We must create a community to prosper and mature with while respecting the individuality within all of us.

I think it is finally the community that needs to occupy centre stage in design, economic, social, and political life. Our capability in moulding and guiding community formation and helping it in decision-making will create a completely new form of design, where instead of authorship, the emphasis will be on sharing and solutions.

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Chapter 8
Groningen: The Spread-Out Charrette

Rob Roggema

8.1 Introduction

In the Netherlands the Climate Changes Spatial Planning (www.climatechangesspatialplanning.nl) program was one of the first scientific programs to study the relationship between Spatial Planning, or land-use, and changes in climatic conditions. The mission of the program was to introduce climate change and climate variability as one of the guiding principles for spatial planning in the Netherlands.

The program consisted of research projects developed in five main themes: climate scenarios, mitigation, adaptation, integration and communication. Projects were interactively defined to cover issues relevant for sectors such as and amongst others biodiversity and nature, agriculture, fresh water, coastal areas, sustainable energy, and governments. A selection of special projects is the so-called hotspots. These projects were developed using a submission and selection process to which individual consortiums, consisting of local municipalities or regional authorities could propose an applied research project (De Pater and van Drunen 2006). One of the hotspots that were selected was the hotspot climate proof Groningen. This hotspot, aiming to identify strategies to transform the land-use of the province of Groningen in becoming climate proof, was linked to the process of revising the regional plan for the area. The latter process usually takes place directed from the spatial domain, with integration of other domains such as the ones enforced by law: environmental policy, traffic and transport policy, and water policy, as well as other domains, such as the economic and nature policy. The hotspot Groningen operated as the lever to include climate policy in the regional plan as well.

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8.2 The Province of Groningen: Historic Region in the Peripheral North of the Netherlands

The province of Groningen is one of the three northern provinces of the Netherlands. The main city, Groningen, is the largest city in the North and the capital of the province. Around the capital a vast open landscape determines the view. Grasslands, farmland, natural reserves and water dominate the countryside. Apart from the main city, the province has two important harbours, one in Delfzijl and the Eems Harbour. To the north it borders the Wadden Sea, World Heritage Site and the most important wetland in Europe. Large areas of the landscape in the northern part of the province are historically interesting. In the early days, around 800–1000 BC, this area was under direct influence of the sea and didn't have any coastal protection. The people survived by using their garbage to lift up their houses on small artificial hills, the so-called *wierden*. These heightened spots are currently still visible in the landscape, sometimes as single farms and in other occasions as small villages. These types of historically valuable landscapes have led to a provincial policy, which is protective in the countryside, while it supports developments in the thriving cities and harbours. The main goal in the regional plan for Groningen states: "Sustainable development – sufficient employment and a for humans and nature liveable Groningen in which the qualities of the physical environment are protected and enhanced and future generations keep enough possibilities for development. This is made manifest in a sustainable living environment, protect and enhance its own character and strong cities and a vital countryside" (Provincie Groningen 2009). The province of Groningen was the first province in the Netherlands to integrate the by law mandatory policy plans of water, environment, traffic, land-use in one regional plan. The area is, due to its geographical position, threatened by a rising sea level, especially when North Westerly storm surges occur. It is also vulnerable for inland floods, which impacts the usability of farmland, in case of increasingly occurring heavy rain events. Further, inner cities suffer from the heat island effect and longer droughts during the growing season affect the agricultural potential.

8.3 Becoming 'Climate Proof'

The ambition written down in the starting document, which announced the start of the planning process for the regional plan in Groningen province and was adopted by the Provincial Executive (GS in Dutch) late 2007, consisted of three pillars and four areas. Apart from the demographic and economic pillar climate was seen as a major policy field to base the province's spatial policy on. In this context 'climate' is seen as both mitigating the causes of climate change through energy saving and efficiency measures, and adaptation to the unavoidable impacts of climate change. Energy supplied by means of renewable sources is mainly located at the Earth's surface, where it impacts and competes with other land-use functions. Therefore, it is considered as part of the adaptation policy. Meeting the climate adaptation ambition in the regional plan justified taking up the Hotspot Climate proof Groningen project. It needed to provide climate policy input in the regional plan.

Therefore the objective of the hotspot project was formulated as: "To design a long-term future for the province of Groningen", and more specifically "to design a future that could withstand and anticipate future climatic changes and provide in its own energy (from renewable sources)". Three concrete objectives were defined (Roggema 2009):

1. Gain and collect knowledge about the climate space interface;
2. Identify the best possible way to integrate climate adaptation in regional planning and decision-making;
3. Extending the network of people concerned with climate adaptation within the province of Groningen.

8.4 Methodology

The way the hotspot research was carried out used a complex methodology, because it needed to comprehend both the integration in the regional planning process as satisfying the demand for concrete adaptation knowledge. Therefore the methodology was split over two components: an overarching method for the integration of the hotspot in the regional plan and a detailed method for refining the best possible ways to adapt the province to future climate change.

The methodology for integration consisted of three planning phases (Fig. 8.1). The first phase started with the adaption of the starting document in the Provincial Council (PS). In this analytical phase the long-term impacts of climate change have been researched (Roggema 2007; DHV 2007) and were part of the Agenda document that finished this phase and formed the basis for the second, interactive, phase. In the interactive phase the discussion took place with external institutions, groups and communities about specific climate aspects, such as the coast, water storage, agriculture, energy and others, and the acceptability of risks as well as climate based opportunities was discussed. In the choice-document, which finalised this phase the fundamental choices were presented to the Provincial Executive and the Provincial Council, who were asked to form their opinion about it. In the third and last phase the Provincial Executive reflected on the spatial impacts of the choices proposed. In this phase the climatic spatial claim was defined in the form of a required amount of space for good adaptation. After the reflective phase the claims were integrated in the final (climate prof) regional plan. Especially in the first, analytical, phase specific research was commissioned to identify the climatic impacts and spatial dimensions related to adaptation strategies (DHV 2007) and renewable energy supply (Van den Dobbelsteen et al. 2007). After the first rounds of expert research the results fed in to a so-called expert day in the Provincial Council, for which nine nationally well-known expert were invited to present their visions and views for the long-term spatial development in the province. The results of research and lectures formed an important input in setting the agenda for the new regional plan.

Secondly, the project method of identifying the best possible way to adapt consists of several steps (Fig. 8.2). A series of design charrettes were conducted for each thematic topic, such as water management, energy, agriculture, nature and the coast.

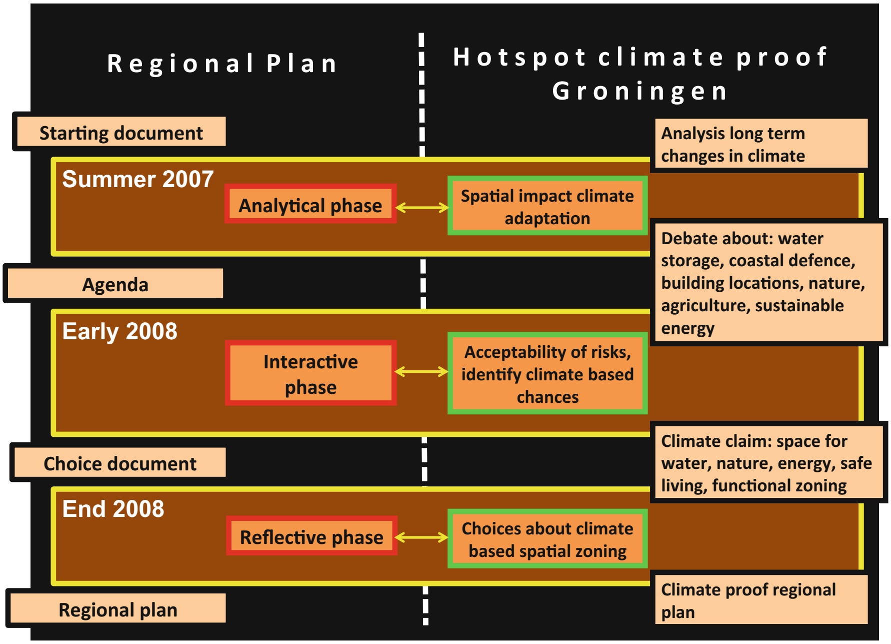

Fig. 8.1 Methodology to integrate results of the Hotspot project in the planning process of the regional plan Groningen

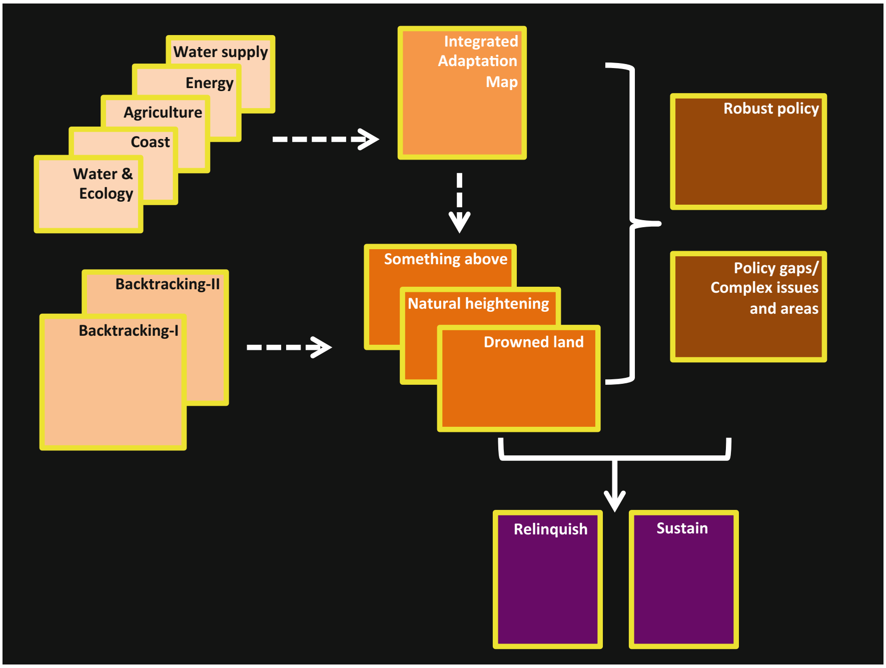

Fig. 8.2 Method of research for the hotspot project

For each of these charrettes, which lasted only 1 day, the assignment was to design the most optimal adapted landscape for each specific theme. In the form of a layered mapping process these thematic maps were integrated in one integrated adaptation map for the provincial area. Parallel to these thematic charrettes two back-casting design charrettes were conducted in which an integrated picture of a future province of Groningen was sketched and modelled in 3D. These two charrettes resulted in three fundamentally different long-term scenarios: 'Something Above Groningen', 'Drowning Land of Groningen' and 'Heightening behind the Dike' (Klooster et al. 2008). In two so-called integration charrettes the integrated adaptation map and the three scenarios were used to identify the area where robust policies had been identified and the areas where gaps, conflicts and complex issues still needed to be solved. The latter areas, the 'windows of Groningen' have been further designed in these integration charrettes and formed, together with the scenarios and integrated adaptation map the basis for two future visions: 'Relinquish' and 'Sustain' (Jacobs et al. 2009).

The process of carrying out the hotspot research has been time-consuming, mainly because the project did not proceed when the right people couldn't participate in design charrettes. The planning process of the regional plan however continued according to original pace. And this meant that the two planning processes found themselves out of step. At the moment that the Hotspot Climate-proof Groningen started the planning was precisely tuned into the process and tempo of the Regional Plan. It quickly became apparent that the time needed to develop the expertise required in order to provide valuable input in the regional plan was too great to be able to link up to that process in time (Fig. 8.3).

Moreover, the wicked nature of the climate change problem played also an important part. At the very moment the problem seems to be clear, it changes again. This is happening on a daily basis and is caused by the long-term period under consideration and a number of other themes are connected to climate change. It is this inter-connectivity on top of the far horizon that makes a simple solution so difficult. Both phenomena, the wicked character and the tempo in which new knowledge can be developed, led to shifting processes, valuable on their own, but no longer connected.

8.5 An Extended Program

The Groningen hotspot is an outstretched design charrette consisting of many, approximately 12, single charrettes (Fig. 8.4). The total length of the process was 18 months, giving room for contemplation and visualisation of intermediate results during the process, feeding into every next step. After the initial kick-off workshop the phase of knowledge development started with six, thematic design charrettes, all lasting one entire day and two back-casting design charrettes, which had an integrated character. For each of the thematic charrettes specialists in the relevant field participated, both from regional institutions, such as the province, the agricultural umbrella organisation (LTO-Noord), water-boards, the water company, energy valley and others, as well as academics from different universities, relevant to the field. In nearly every design charrette, regional politicians took part. In the integrated

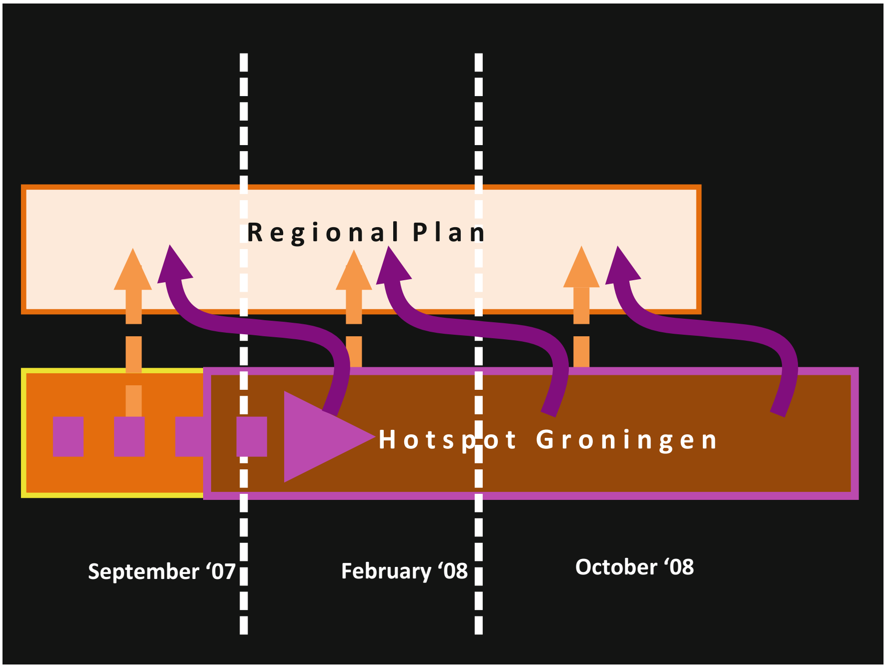

Fig. 8.3 Regional Plan and Hotspot out of pace

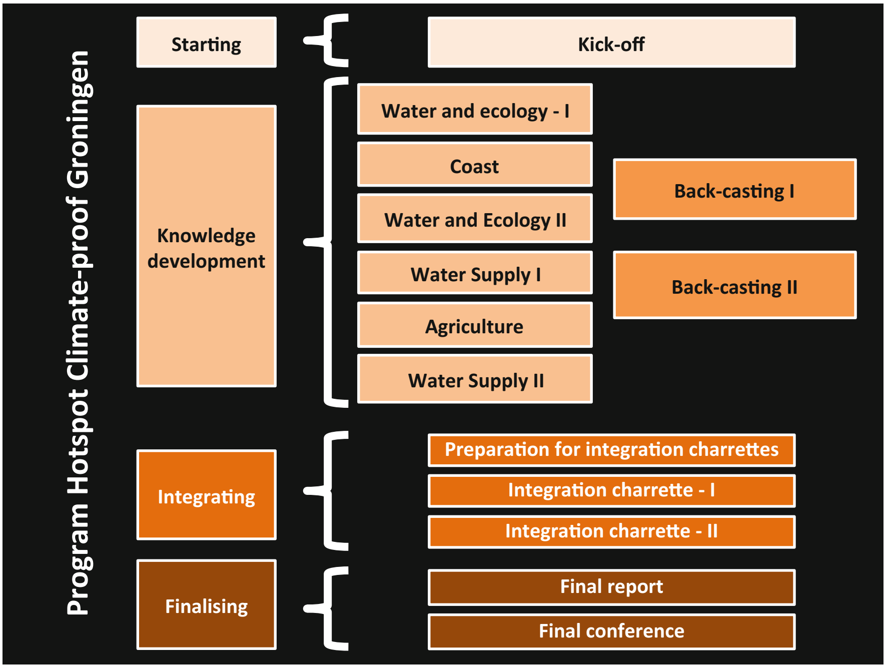

Fig. 8.4 Programming the Hotspot Climate-proof Groningen

back-casting charrettes people academics from different universities, consultancies, the federation of environmental organisations, water-boards and the province participated. A selected group of experts were involved in the integrating phase. Three universities, specialised consultancies, two water-boards, the LTO-Noord, water company Groningen and two provinces discussed the integration of information, designed at the detailed level and developed integrated future visions. This phase was followed by a finalising phase in which the final report (Roggema 2009) is written and the final conference was organised. This concluding conference, hosted by two regional ministers, exchanged experiences and presented the results of the research project. At the final conference, Provincial Council Members, Members of the Provincial Executive (i.e. the regional ministers), national government representatives, NGO's, municipalities, the province and many other provinces, several universities, the national knowledge programs on climate adaptation, consultancies and NGO's and others attended, in total over 150 people.

8.6 Groningen: A Climate Proof Region

The project results of the Groningen Hotspot illustrate the efforts of the province to strive for becoming a climate proof region. The results discussed in this chapter were derived from the sequence of design charrettes and delivered not only content on thematic adaptation, but also integrated visions and propositions new methods and planning processes.

8.6.1 A Wicked Bypass

Climate change is characterised as an untamed or wicked (Rittel and Webber 1973) problem (VROM-raad 2007; Commonwealth of Australia 2007; Lazarus 2009). These problems are complex and are strongly and in an integrated way connected to other problems. The definition of the problem is unclear and can change over time, and there is no final solution to these kinds of problems. In dealing with wicked problems the best possible action need to be identified over and over again and is dependent on the context. This is extremely difficult, because the tame environment will repeatedly demand concrete, measurable assumptions, which cannot be provided from the context of the wicked problem. One of the outcomes of the Hotspot Groningen is a method, which weaves a wicked (untamed) problem (e.g. climate change) into a tame environment (the regular planning process): the wicked bypass (Fig. 8.5).

In this *bypass*, the freedom is created to think in qualitative terms and not to see solving problems as a first task. Deviant techniques, such as backtracking, are applied. In this environment new knowledge and new designs are developed. The outputs of this 'parallel track' not necessarily need to fit into the regular, tame planning process. The wicked bypass creates the supreme environment for developing a long-term vision.

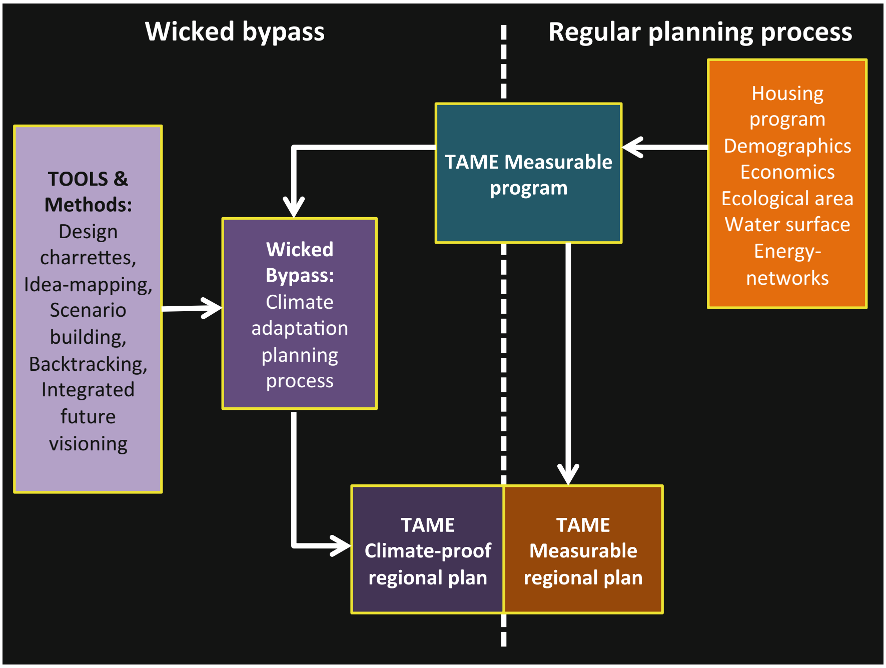

Fig. 8.5 A wicked bypass and regular planning process (Roggema 2009)

8.6.2 The Coast

To protect the province of Groningen for sea level rise and storm surges the robustness and flexibility of the coastal defences must be enhanced through implementing multiple protective solutions at each single location (Roggema 2008a). A broad dike zone not only guarantees safety but can also be used as nature reserve, for agriculture, recreation or housing. Strategic solutions must be realised within 50 years from now. Examples of these type of solutions are ComCoast solutions (www.comcoast.org), super-dikes where necessary or compartmentalization. On the longer term, 50–100 years, or when sea level rises more rapidly than currently expected (2–5 m) more extensive solutions are required, such as new protective islands, dynamic influence of the sea on land, living and working in dynamic conditions, such as in salt marshes habitation or artificial islands, e.g. Delfzeiland (Klap 2007). A certain degree of central direction is indispensable, because short- and long-term solutions and project need to strengthen each other instead of becoming contra-productive. In order to signal the necessity of more fundamental solutions and in order to anticipate future storm surges, close monitoring of sea level rise is required (Fig. 8.6).

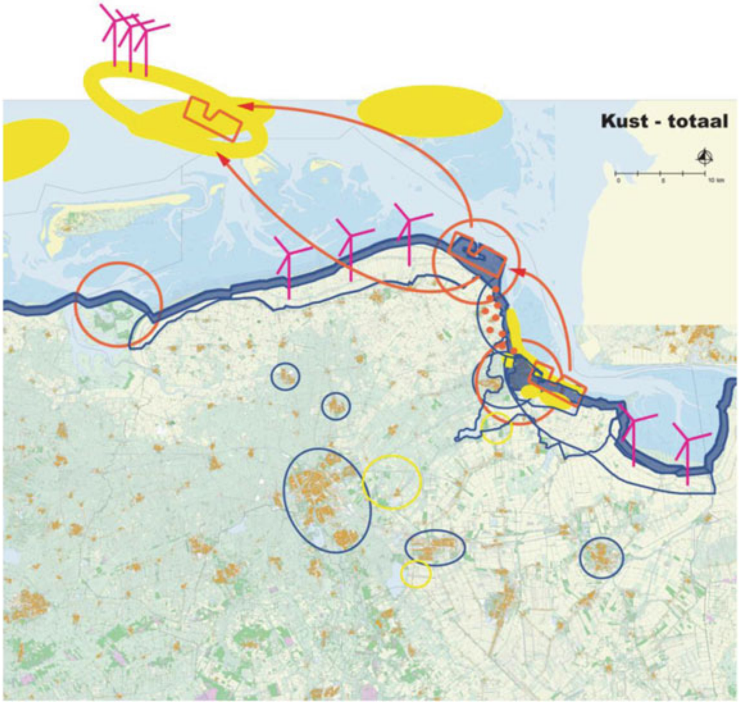

Fig. 8.6 The multiple solutions for each section of the coast (Roggema 2008a)

8.6.3 Energy

In order to create a sustainable energy-supply system that anticipates future changes in climate (Roggema 2008b) it needs to be low carbon, local and renewable. Developments at the global level determine prices and distribution at regional and local scales. Therefore, to strive for an independent energy provision at regional and local levels it needs to make use of its own available renewable resources. Energy prices are expected to rapidly rise and this causes limits in availability of fossil resources. If present policy is able to deal adequately with the consequences is doubtful. It needs to comply with the needs of decentralised production of energy, which has fundamental consequences for the way energy is distributed. The energy networks need to be capable to accept de-centrally produced electricity and gas. The degree to which alternative sources of energy are prepared for a future transition is, at this stage in time, minimal. This causes a serious risk when the shrinking availability of fossil fuels is considered. A de-centralised system implies energy production on a lower level of scale. Individual households would need to be able to supply energy to the network as well as extracting. This means an endless number

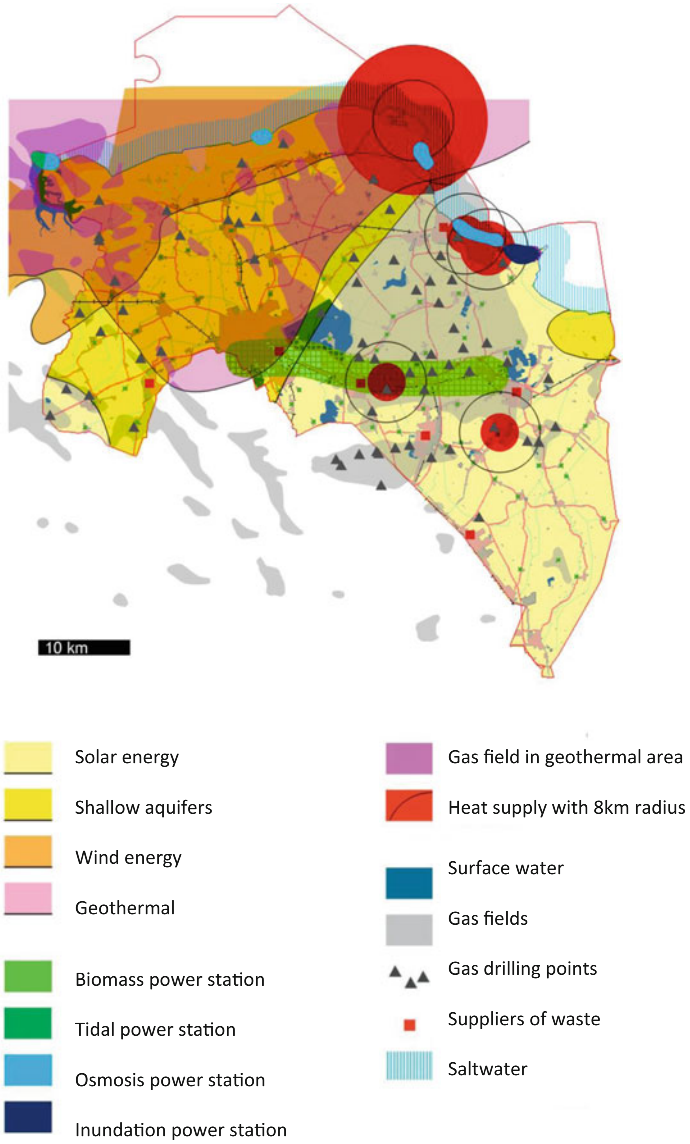

Fig. 8.7 The energy mix map for Groningen (Roggema et al. 2011)

of small power stations (e.g. the individual households) would come into existence. In order to achieve an optimal mix of sustainable energy the energy potential mapping methodology (Van den Dobbelsteen et al. 2006) is used, in which for each source of sustainable energy an energy potential map is produced. When all renewable resources (solar, wind, geothermal, hydro and biomass) are combined the result is an energy mix map (Fig. 8.7).

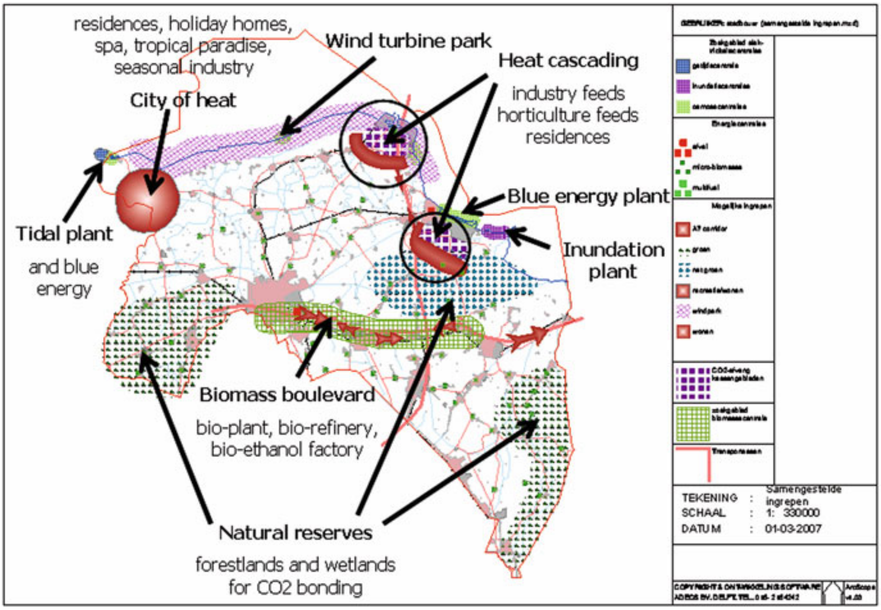

Fig. 8.8 Spatial interventions based on the spatial availability of renewable resources (Van den Dobbelsteen et al. 2007)

When the potentials of local renewable resources are analysed and their use increased and is made available to households, the spatial configuration differs from a centralised system based on fossil resources, which can be distributed in any chosen way from a central point of distribution (e.g. the point where electricity is produced). Local renewable resources are not evenly distributed over an area hence their availability determines specific uses. The analysis of these regional available resources (through Energy Potential Mapping) informs the best possible locations for each land-use type from an energy 'logic' point of view (Fig. 8.8).

8.6.4 Water and Ecology

The ecological system is strongly connected to the water system (availability or absence of fresh and clean water) in a certain area. The ecological network can be extended in several ways to adapt to future climate change. First of all connectivity needs to increase. The degree to which different species can move to other areas depends not only on their mobility or ability to disperse but also on the speed at which climate changes. The rate of temperature change in the Netherlands in the past 30 years (a rise of 1 °C) is too high for the less mobile species to keep abreast of (MNP 2005). In order to give these species a chance it is of great importance to increase the connectivity between natural areas and to remove barriers, such as roads and railway lines. Secondly, it is necessary to increase the capacity, which means making habitats more robust and more varied. Besides affecting the geographical spread of species, climate change has an effect on the physiology, the phenology and the genetic adaptation of species. In addition, changes caused by climate change take place in the abiotic conditions in their areas of habitation. All of this leads to changes in functional relations between species, which in turn cause changes in the composition, structure and so also in the functioning of ecosystems (Vos et al. 2008).

Another aspect of a changed climate is the occurrence of more extremes in weather conditions, with greater fluctuations in numbers as a result. This increases the chance of populations dying out, especially in smaller natural areas. Large interconnected natural areas (the key areas) are therefore important for the survival of species, because they have enough surface capacity to accommodate durable populations. The creation of internal heterogeneity within natural areas (gradients of wet-dry, open-shaded) can help species to survive extreme weather conditions and to suppress too great fluctuations in numbers.

The effectiveness of national ecological strategies, such as the EHS (Dutch National Ecological Network) and the Robust Corridors can be increased through concentration in a well planned "adjustment zone" (van Rooij et al. 2007). Adaptation strategies work out differently at the regional and local scale.

Adaptation strategies at regional level:

- Connect nature areas;
- Increase size of nature areas;
- Include adjustment of the natural environment in an integral adjustment strategy.

Adaptation strategy at local level:

- Realize multifunctional climate buffer zone around nature areas;
- Increase internal heterogeneity (gradients) within nature areas;
- Improve the abiotic conditions within nature areas.

Key areas where specific species live and reproduce themselves (their habitat) need to be extended in order to provide a buffer for external climatic impacts and adequate living space for lasting survival is provided. Secondly these core ecological areas need to be connected at the level of the province as well as link up with higher scale networks, such as the water catchment in the southerly Drenthe province or with marshlands in Friesland in the west and Niedersachsen (Germany) in the east. These connections are vital because they allow species to move along with changing climate zones and reach new habitats.

In order to create an adaptive nature in Groningen the different ecosystems are combined into one climate-proof ecological network (Fig. 8.9). There is a noticeable lack of east-west connections between the existing north-south oriented ecological structures.

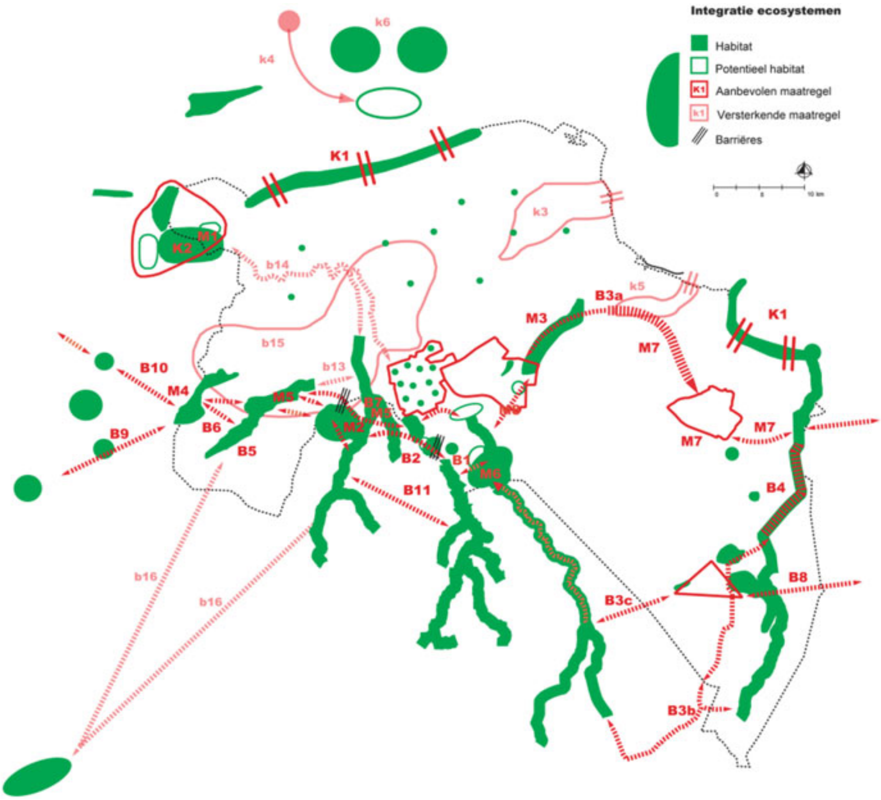

Fig. 8.9 Climate adaptive ecological network Groningen (Roggema et al. 2009a)

Coupling ecological structures to a water system, which is adaptive for climatic change improves the qualities of both water and ecology. An extended and connected network of ecological structures and the water system provides the size, connectivity and flexibility to react, adapt and anticipate future change (Roggema et al. 2009a). The total system is, due to hydrological reasons, divided in four distinct areas. The stream valleys (Fig. 8.10), located in the southern part, need to enhance their infiltration and storage capacity with local storage of rainwater in natural layers (Grontmij 2002). Small-scale natural measures need to retain water and store it. Through the higher number of extreme rainfall events the amount of nutrients washed down into the streams will increase. This problem can be tackled at the source by using less fertilizer or by raising the edges of the fields so that the discharge of surface water is reduced. In addition, a buffer zone can be created, in which the zone round the stream is kept free of farming. Lastly there is a possibility of allowing only low-dynamic extensive farming in the upper reaches of the stream. In the long term this washing out process must stop entirely. This means that farming has to disappear from the stream valleys.

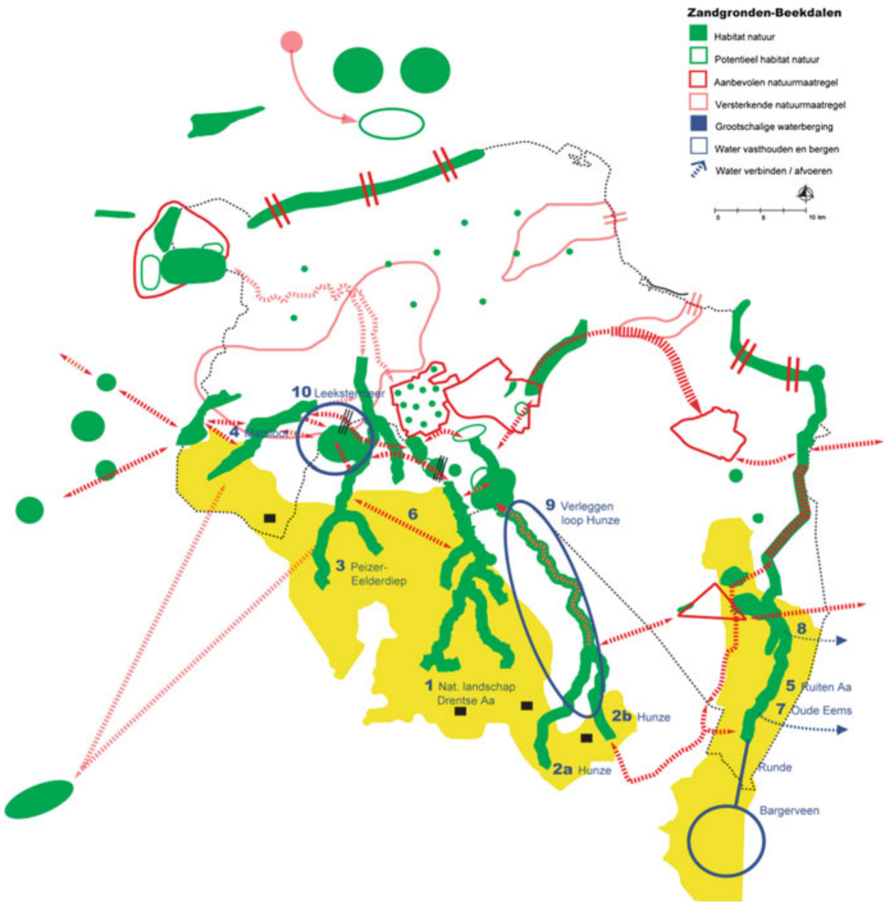

Fig. 8.10 Adaptive ecology in the stream valleys (Roggema et al. 2009a)

The former high peat lands in the Peat Colonies (Fig. 8.11) need to become self-sufficient both in quality (increase capability of cleansing its own water) and quantity (retain as much water as possible in the area) (Grontmij 2002). This area has been long familiar with a strong technical approach to harvest turf from the peat. It seems an obvious choice to retain water technically by a clever management of small dams or by raising the water levels in the canals and waterways enhancing the storage capacity. A long-term improvement of the system would imply a land-use change from farming to a natural reserve.

The low-lying areas are located in the centre of the province and are an ideal buffer for large-scale storage (Fig. 8.12). This results in a self-regulating robust water system with wet marshland areas, through which watercourses are threaded with important recreational functions, and which can be used for additional storage in the event of a high tide (Grontmij 2002). The main question is how much

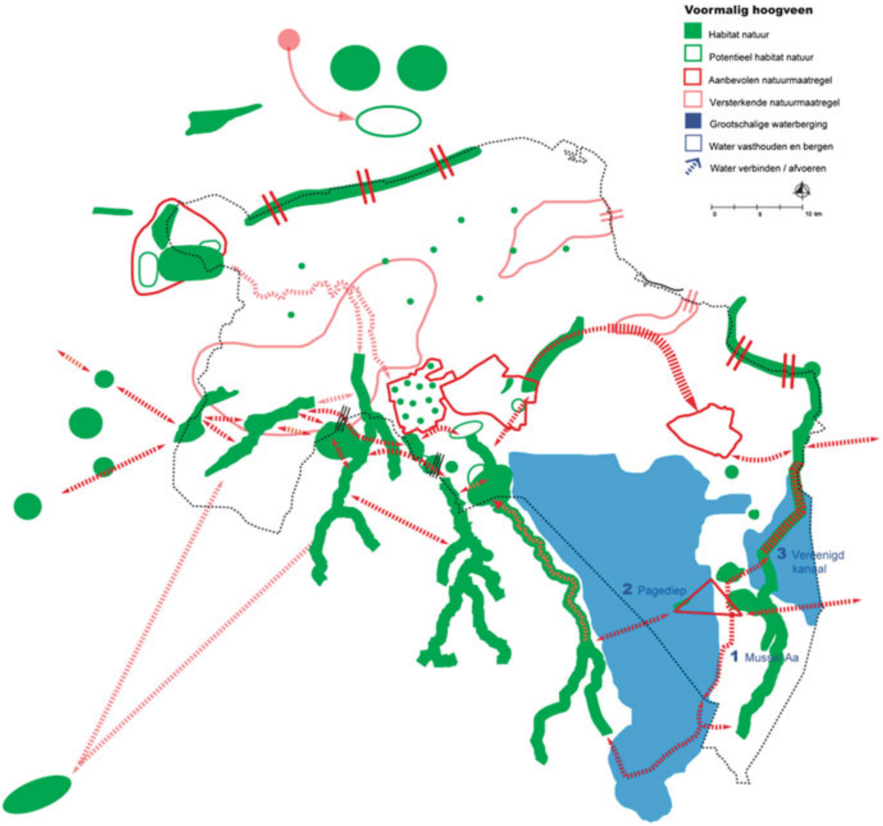

Fig. 8.11 Ecological adaptation measures linked to the former high peat areas (Roggema et al. 2009a)

water can be stored in this area in order to adapt to climate change. It is assumed that within the catchment 100 % additional capacity will be required to deal with upcoming changes, which is approximately between 15 and 30 million m^3, which is not an easy task.

The marine clay areas are located along the coast (Fig. 8.13) and are elevated above the hinterland areas. This is the result of natural sedimentation, the formation of salt marshes and the construction of dikes afterwards. From a hydrological point of view this area needs to become self-sufficient supply and discharge of water (Grontmij 2002). The water system in the marine clay area will be drained and pumped. Ecological opportunities lie in the brackish environment and salt marshes. If sea level rises rapidly (over 60 cm this century) it might be possible that approximately 40 % of the sandy shallows in the Wadden Sea might disappear under water (De Boo 2004). The salt marshes will then suffer damage from erosion and need to be reinforced and supported to grow sea-ward, which is in ecological terms very desirable.

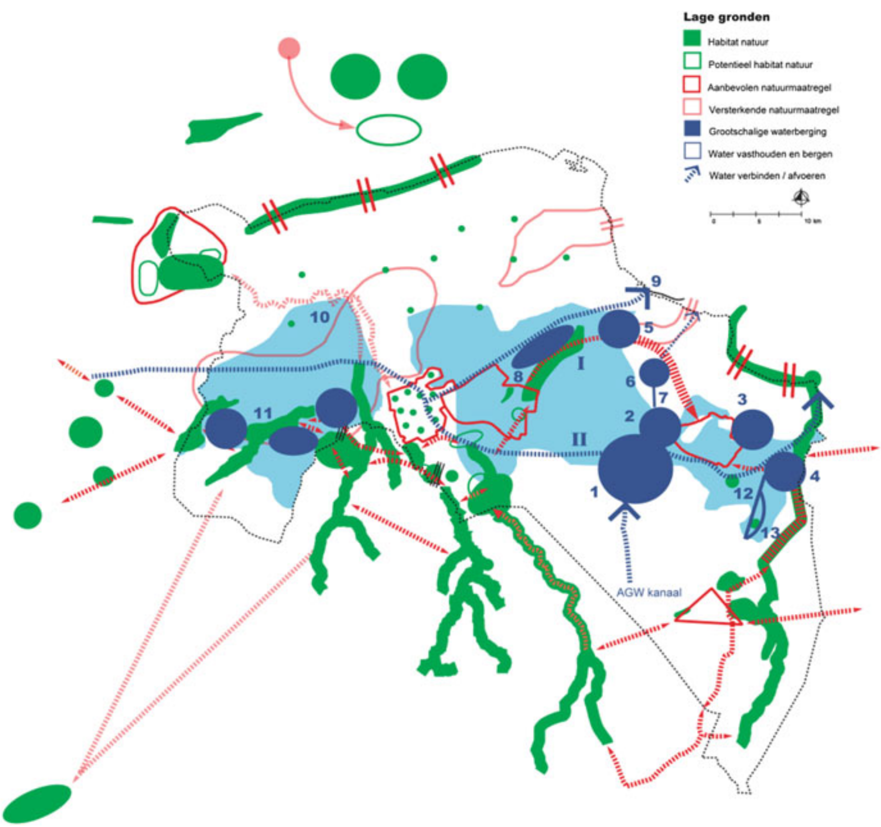

Fig. 8.12 The adaptive ecological measures connected with the low-lying areas (Roggema et al. 2009a, b)

When the required connections and extensions to become climate proof are compared with current ecological policies vital connections and additions are missing and need to be installed (Fig. 8.14).

8.6.5 Water Supply

One of the major problems of the future will be to supply enough and clean water under stresses of climate change. Several strategies are determined to anticipate this future challenge (Roggema et al. 2008). It is always good to save water, because this means less water needs to be transported and supplied. Secondly, water that has been used for a certain function can often be re-used for a (lower grade) function. The efficiency of this cascading can be improved through spatially link land-use functions in chains of higher and lower grades use. The third strategy that has been identified is to obtain and retain locally available water. It is estimated that in the

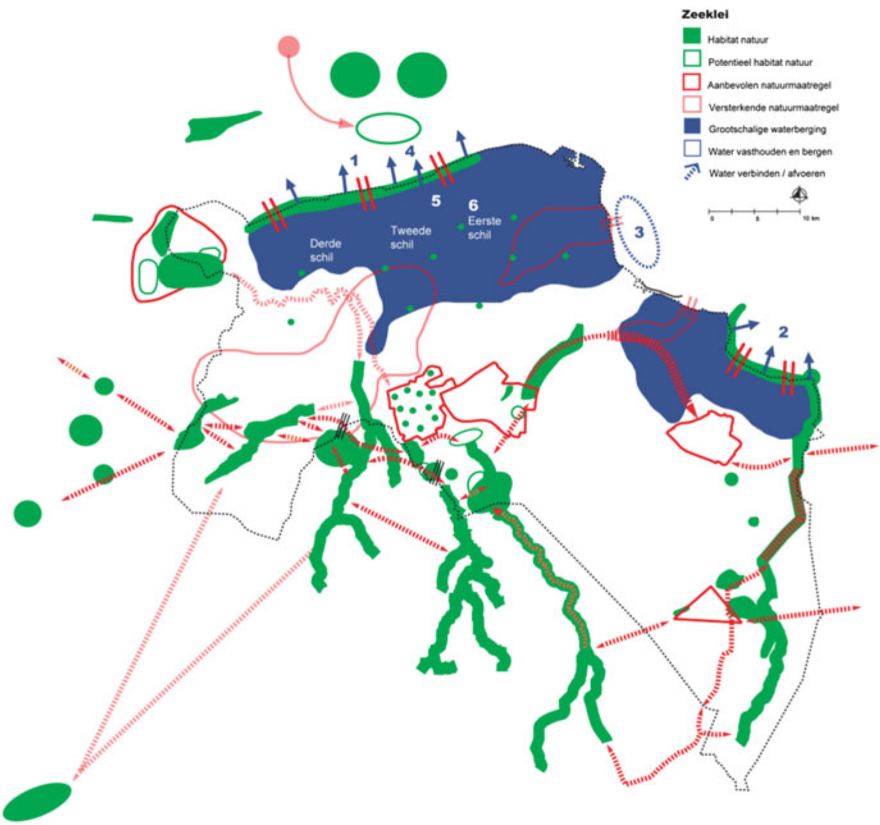

Fig. 8.13 Ecological measures to become adaptive in the marine clay area (Roggema et al. 2009a)

future in the winter more rain will fall, while the summer will experience longer periods of extreme drought. Instead of pumping the water in winter as quickly as possible into the sea, which means that it has disappeared and become brackish, this valuable water needs to be collected and stored in order to become available in the summer droughts. This requires space and potential changes in land-use. Finally, in industrial processes it is often possible to re-use waste in an innovative way. For instance, waste heat when drying agricultural crops produces water again and algae make freshwater from saltwater. When these innovations can be linked into the chain at the right places then they can make a valuable contribution to an efficient water (and energy) supply.

The design charrettes about water supply used backtracking to develop four distinct future scenarios for a climate adaptive water supply. The historically sustainable equilibrium is to be found in the map of 800 BC. This map shows a dynamic equilibrium between fresh and saltwater, and the influence of the sea and the discharge of the freshwater from rainfall. People lived on mounds in the landscape (called 'wierden'). On the plateau rainwater was hold (and stored) by the vegetation for a long time. Water was re-used continually, from household use to watering

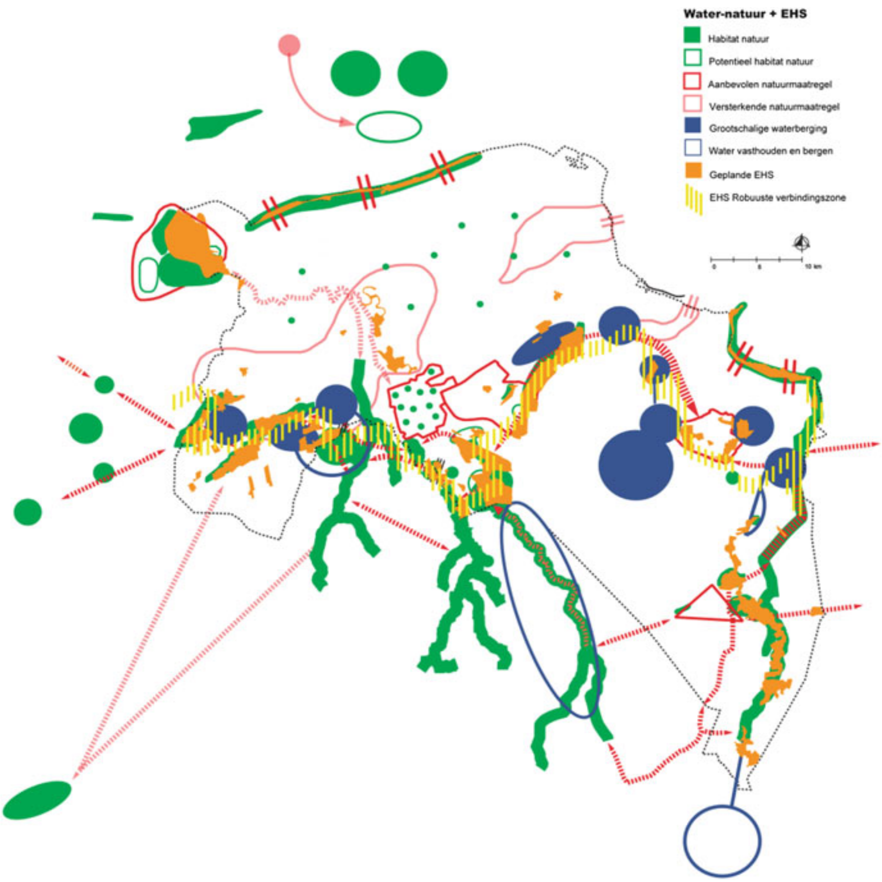

Fig. 8.14 Climate adaptive ecological and water structure in Groningen province, in comparison with current ecological policy (Roggema et al. 2009a)

the fields and finally discharged through little streams. When the principles that were apparent in this historic sustainable equilibrium are used to design the future the following elements can play a role:

- Restoration of retention capacity on higher grounds;
- A smooth land – sea transition, where the majority of economic activities take place, waste products and waste heat is used, and energy and water is re-used and cascaded;
- Re-use of water and farmers as producers of clean water ('Blue Farmers');
- At the foot of the 'Dog Ridge' (Hondsrug) the rainwater, which flows from the plateau is stored and clean freshwater seepage is collected in a buffer;
- Developing saline agriculture along the coast.

In the meeting of experts these principles were used to design four scenarios.

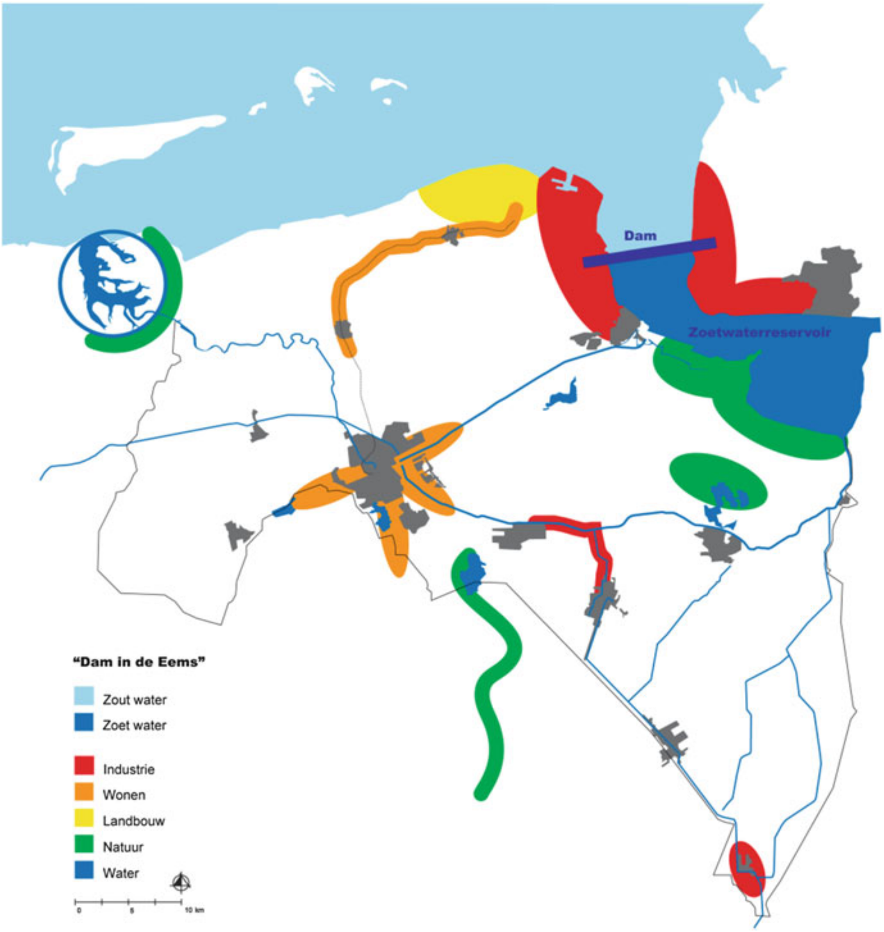

Fig. 8.15 The 'Dam in the Eems' scenario (Roggema et al. 2008)

8.6.5.1 Dam in the Eems

This scenario proposes the construction of a 'closure dam' between Emden and Delfzijl (Fig. 8.15). The Eems-Dollard estuary becomes a freshwater reservoir. The dam will be used to generate 'blue energy' (www.wetsus.nl) through the use of osmosis power when freshwater and saltwater meet. To the northwest high quality (new) agriculture is located, while the area to the south is shaped as a recreation area. The dam must be built in a way that ships to the city of Groningen and upward the German river Ems are guaranteed generous passageway. To the north of the dam energy power stations partly constructed in the water are proposed.

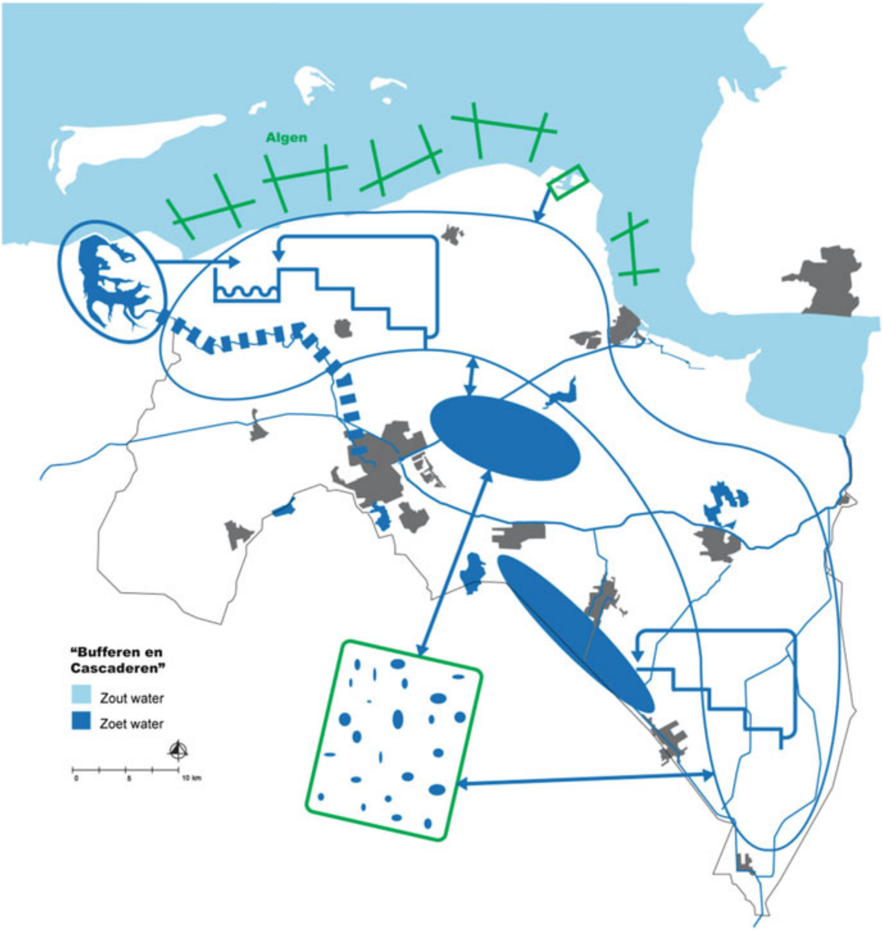

Fig. 8.16 The 'Buffering and Cascading' scenario (Roggema et al. 2008)

8.6.5.2 'Buffers and Cascading'

The central principle in this scenario is to use water cleverly by saving, cascading and re-using water, and by creating buffers for rainwater (Fig. 8.16).

Buffering. Rainwater supplies the majority of freshwater to the region through rivers and streams. The water supplied will have to be retained in the ground (using the sponge effect of the 'Drenthe-plateau') and at surface, using existing lakes and by creating new centrally located lakes close to water users. In order to create these new lakes land-use changes are foreseen for agriculture turning into water-rich natural reserves. These lakes must be large enough to absorb a sudden extreme amount of precipitation. In order to prevent freshwater from draining off into the sea without being used, excess water will be transported back 'upwards' to the sponge of the Drenthe plateau. The transportation of water back to the plateau is achieved through new rivers. Existing rivers and streams ensure that freshwater is stored in lakes, while new rivers and streams ensure water is supplied back to these reservoirs. Water, which is transported back up in the system can be used water suitable for natural purification and which can subsequently be reabsorbed in the cascade.

Cascading. The cascading process provides water in steps according to need: from high to low quality, from surface water as an ecosystem to water as a raw material subsequent serving nature and recreation, housing, agriculture, and industry. Cascading is an optimization of water use in housing and in industry. Individual companies or clusters of companies can cascade water on their own or together. The saving of water in industry is meaningful and valuable. Here measures can be integrated and implemented in a way that not only is water re-used but raw material can be retrieved. This is economically beneficial but also to preserve natural resources and the environment. Cascading matches the quality of water to the purpose for which it will be used. Transportation of large amounts of water over big distances for industrial use will no longer be necessary. Assuming water at the end of the cascade is suitable for natural purification, it can be brought back into the system from the start.

8.6.5.3 Who's Afraid of Blue, Green and Red….?

The safest, most sustainable and cheapest perspective for the future is to move along with natural systems and use their power, such as 'building with nature' (http://www.ronaldwaterman.com/page10/page10.html) and 'integrated coastal zone management' (http://ec.europa.eu/environment/iczm/home.htm) illustrate. This scenario (Fig. 8.17) makes optimal use of the sponge-function of the Drenthe plateau and enhances the forming of salt marshes in the zone between fresh- and saltwater. Where possible, a 'transparent' dike can be proposed, which allows water to pass through and creates a temporarily wet area behind it. Building is allowed here, but in the knowledge that it can become inundated. Further, freshwater is collected close to the coastline, up against the coast, where water storage, nature development, combating salt intrusion, recreation and water preservation for industry are functions to combine. The Wadden Sea is an area where ecological reserves and recreation are to be retained. Here, possibilities for algae basins are apparent. In this scenario is also space for urban developments, such as housing and industry near the coast or the development of super-farms in the Peat Colonies.

8.6.5.4 Natural Self-Sufficiency

This scenario proposes to create a self-sufficient water supply in the region (Fig. 8.18). Prerequisite of realizing this is to raise awareness among the population and stakeholders that a transition is really necessary. Instead of a dooming

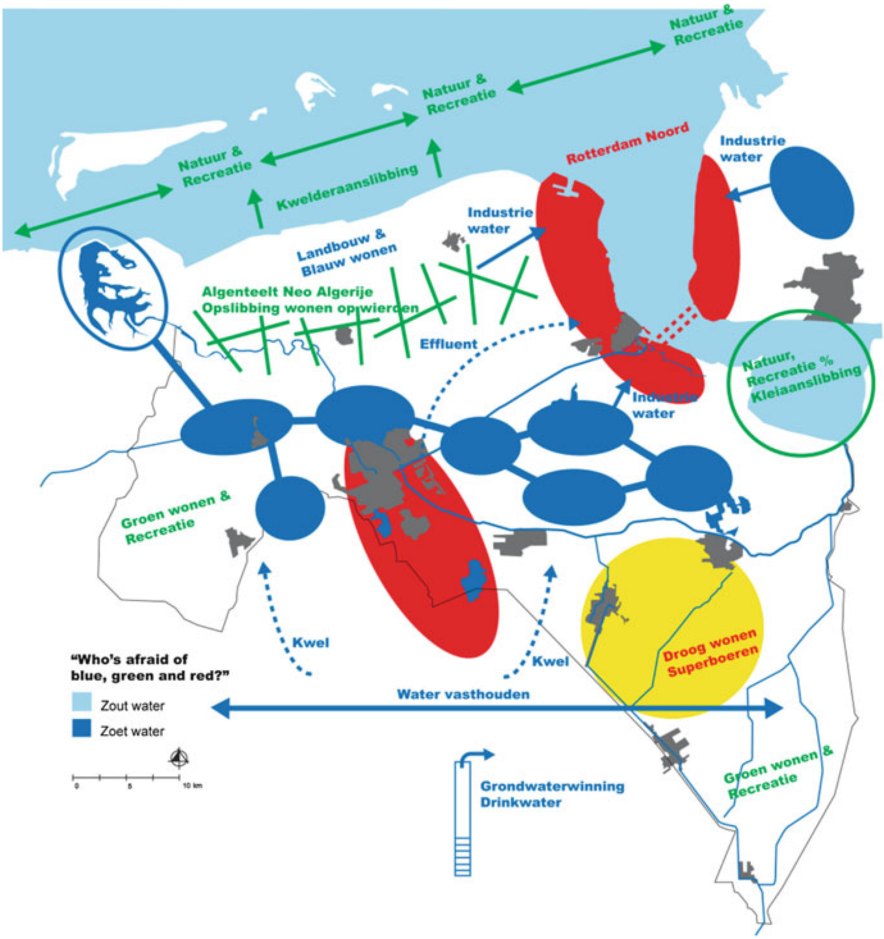

Fig. 8.17 The 'Who's afraid of Blue, Green and Red….?' scenario (Roggema et al. 2008)

scenario approach the proposition is to arouse a "sense of excitement" to start to think on the basis of natural opportunities. This means industry and housing must primarily be located on the higher elevations in the landscape and not in low-lying wet areas. Retention basins need to be created at places where water flows to in the event of rainfall. Along the north coast natural sedimentation is enhanced to create natural salt marsh formation, which functions as a buffer. And finally, according natural principles the production of seed potatoes in the northern coastal region continues as expected brackish conditions provide conditions against potato diseases and the clay soil forms an excellent fertile basis. It is further proposed that the northern coast transforms into new land over the coming 50 years as a result of

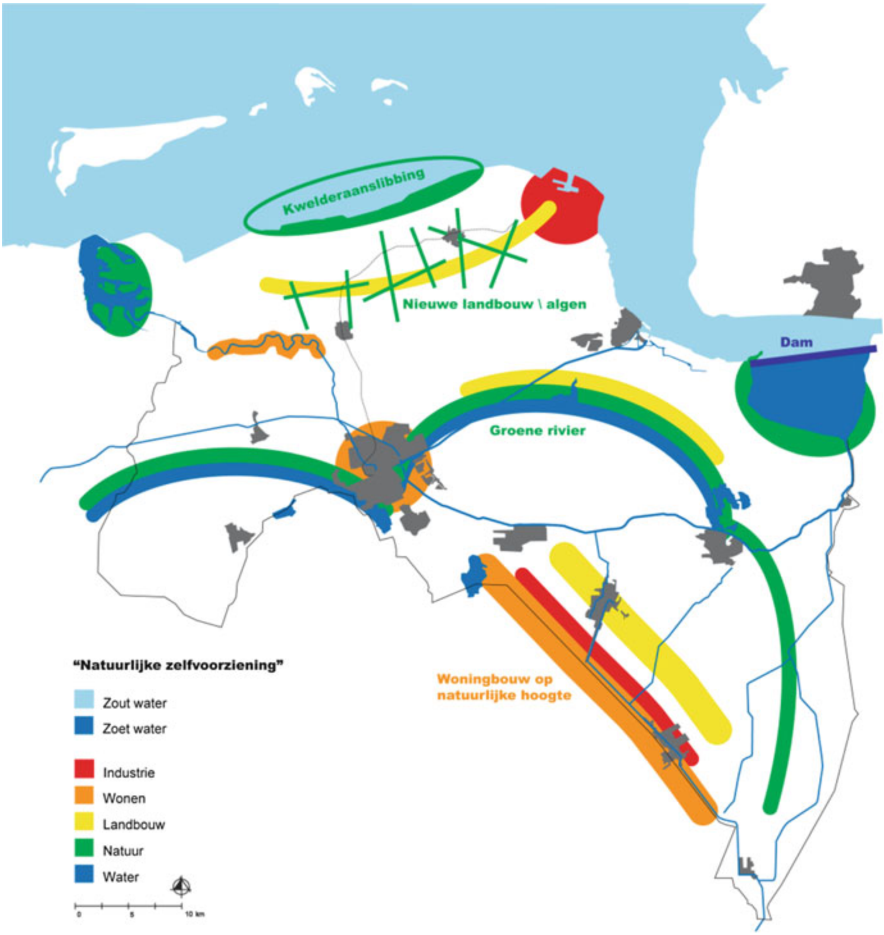

Fig. 8.18 The 'Natural self-sufficiency' scenario (Roggema et al. 2008)

silt deposits and sedimentation, and this zone functions as a buffer zone for salty seepage. The coast offers the possibility to widen the dike zone, providing improved safety. A 'green river' is a proposed ecological and water connection inland and the 'Dollard' is dammed to retain discharging water in combination with ecological and environmental development. The Peat Colonies are seen as the area to mainly develop farming and food-processing industry, in combination with limited area of housing. The majority of residential area is proposed in the city of Groningen, on higher ridges in North Groningen and on the 'Dog Ridge' (Hondsrug) on the Drenthe plateau. In the Eems Harbour and surrounding areas new industries are foreseen in combination with new forms of agriculture, such as aquaculture and algae basins.

Fig. 8.19 A combinatory of four agricultural futures: arable farming, stock farming, saline crops and energy farming (Roggema et al. 2009b)

8.6.6 Agriculture

A future agriculture in the Groningen area, which is adaptive and anticipates future climate change, is a combinatory of four specific ambitions for different elements of the agricultural system. The four maps, of arable farming, stock farming, saline crops and energy farming, are combined into one integral map (Fig. 8.19) under the motto of "what reinforces yet does not exclude each other" (Roggema et al. 2009b). Each part of the area retains its own specific typology of future agricultural opportunities. The coastal area needs to deal with increased salinization, offering potential for cultivating saline crops will be limited. Outside the dikes is a large potential for saline cultivation in contained systems. In the Wadden Sea, close to the coast an artificial reef is proposed to develop new crops and production techniques. The division between land and sea loosens. In the North-Groningen inland area seed potatoes remain the major crop. Mixed farms will be found in-between these large potato farming areas. The availability of freshwater is very important, as is the refinement of potatoes to more stress-resistant sorts. In the Peat Colonies remains important for stockbreeding and arable farming and, in addition, as underground water storage. Potentially, the Peat Colonies can develop as an area for 'blue gold', e.g. water farmers, whose main product is the supply of clean water. Interconnectivity of functions, such as housing, recreation, water storage and ecology will increasingly flourish. Residential areas are located across the province and provide the demanded water supply to farming. In the future numerous innovations are possible in agriculture. On the one hand this is needed because of market conditions and the adaptation to a changing climate, on the other side it is required as a result of other needs, such as the demand for sustainable energy and saline crops. Thanks to its ability to innovate and its business instinct, agriculture in Groningen is well suited to take advantage of the new opportunities, such as 'green' greenhouses, algae, fisheries and energy crops.

8.6.7 Scenario Development

Climate change requires thinking about the far-away future. Different techniques are possible to undertake this challenge: forecasting, back-casting and backtracking (see Box text).

Box text: Forecasting, Back-Casting and Backtracking

Forecasting (*predicting*): A prediction is made about the future, which is to be expected on the basis of already existing and perceived trends. On the basis of these the results of existing developments are assessed as accurately as possible. The result of forecasting is that along the way to the future small steps can be defined which are based on the existing paradigm. Taking account of the uncertainty and the long term in which climate change takes place, forecasting is not the most obvious approach to choose.

Back-casting (*predicting backwards*): In back-casting a desirable (climate-proof, sustainable) future is described. This desirable situation is then translated back into strategies and measures, which from today must be implemented step by step in order to achieve that desirable future. If a fundamental strategy, focused on the long-term, is needed, as in the case of climate change, then back-casting can be very effective.

Backtracking (*predicting backwards inspired by looking to the past*): Backtracking describes a situation in the past when one could speak of a

(continued)

(continued)

climate-proof and sustainable equilibrium. This situation is used as a source of inspiration when formulating a desirable (climate-proof and sustainable) future. Subsequently this desirable situation in the future is translated back into strategies and measures, which from today must be implemented step by step in order to achieve that future. In this way, valuable solutions from the past, which have already proved their worth become part of a vision of the future and qualities from the past become linked with the future. This method is also very suited to discovering what the qualities and values of a region are, what essential features must be secured for the long term and how the area functions by nature. By basing a vision of the future on these characteristics it is possible to increase the degree to which the area will be climate-proof.

Both back-casting and backtracking were used during several of the design charrettes in the hotspot climate proof Groningen. The backtracking process, used in the water supply charrettes is described in Sect. 8.6.5. Back-casting is the main technique used to develop integrated scenarios for a climate proof future in Groningen (Klooster et al. 2008). The ability of Groningen to withstand climate change in the long term (2100) was chosen as the basic objective while developing scenarios. The first exercise took the KNMI W + scenario (KNMI 2006), seen as the scenario that impacts on the local landscape of Groningen the most, as the starting point. Two ideal pictures were designed (Fig. 8.20): 'Gul Groningen' (Generous Groningen) and 'Natuurlijke ophoging achter de dijk' (Natural heightening behind the dike).

On the basis of these first designs more extreme starting points were chosen. Two scenarios were designed taking a sea level rise of 5 m and one scenario using 1.30 m, being the upper limit of the Delta Committee advise on long-term sea level rise for the Netherlands (Deltacommissie 2008), as starting points, both with 2100 as the time horizon. These more extreme starting points were used to thoroughly test the robustness of the two initial scenarios, but also emphasising a less probable but not unthinkable long-term future.

8.6.7.1 Drowned Land of Groningen

In this scenario (Fig. 8.21), using a 5 m sea level rise as starting point of the design, the most important functions, such as housing, industry and agriculture, retreat from the largest part of the province of Groningen and relocate to places that are at least 5 m above the present NAP (Normal Amsterdam Level). The area left behind turns into a new Wadden Sea, where sedimentation, dune forming and natural sand banks will emerge. Hence, North Groningen becomes a sedimentation basin. The elevated area is protected from sea level rise and storm surges.

8.6.7.2 Something Above Groningen

In the offensive scenario 'Something above Groningen' (Fig. 8.22), also based on the assumption sea level will rise 5 m, a system of coastal defences in front of the current coast are proposed. This layered coastal defence consists of new barrier islands in front of the existing ones, an enhanced process of dune forming attached to and in between the present Wadden islands and compartmentalisation of landscape units in the Hinterland. This defence protects the existing landscape, which can operate as it always has done. In this scenario intensive cooperation with neighbouring provinces, such as Friesland, and Germany needs to be arranged in order to build the offensive new barrier islands.

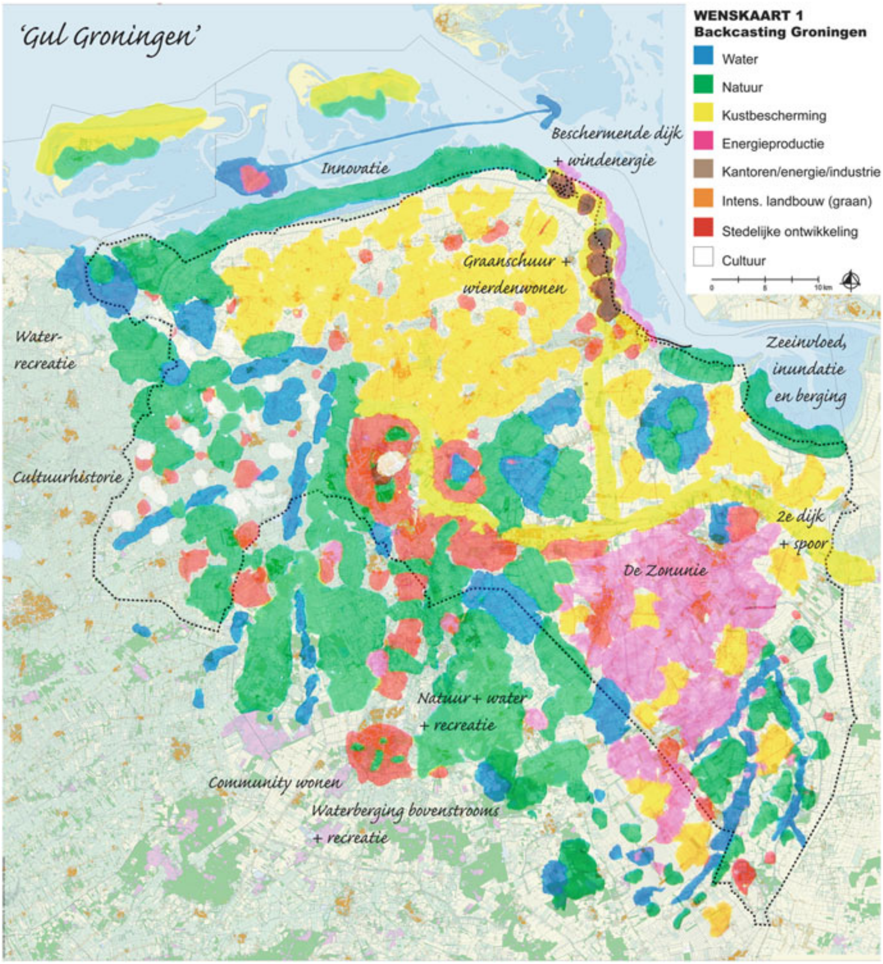

Fig. 8.20 Two initial scenarios for an integrated climate proof vision: Generous Groningen and Natural heightening behind the dike (Van 't Klooster et al. 2008)

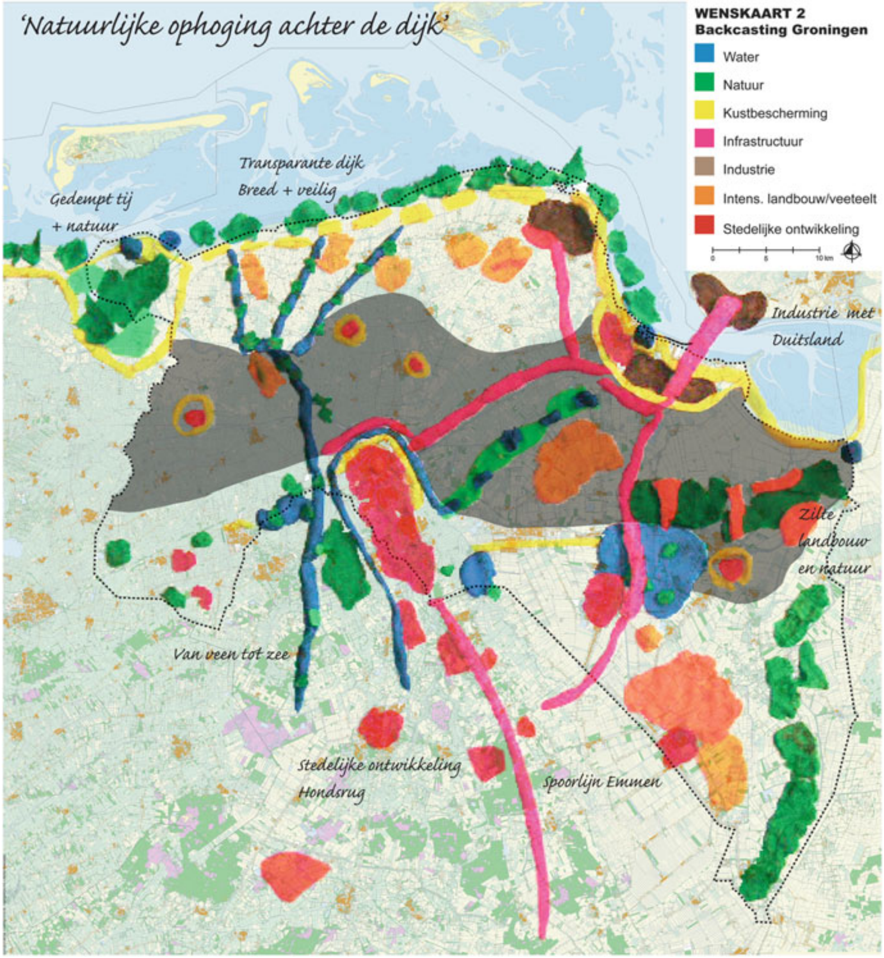

Fig. 8.20 (continued)

8.6.7.3 Natural Heightening Behind the Dike

The 'Natural Heightening behind the Dike' scenario (Fig. 8.23) takes a rise in sea level of 1.30 m as the starting point. This scenario proposes to allow seawater to inundate the Hinterland in order to enhance processes of sedimentation, which will cause a natural rise of the surface level behind the dike. The inundation is a step-by-step process allowing the landscape to rise in subsequent compartments. At times of inundation agriculture has to be banned temporarily until the sedimentation process is completed and farmers can return to even more fertile soils. A floodgate controls the inundation in each compartment. Over time the subsequently

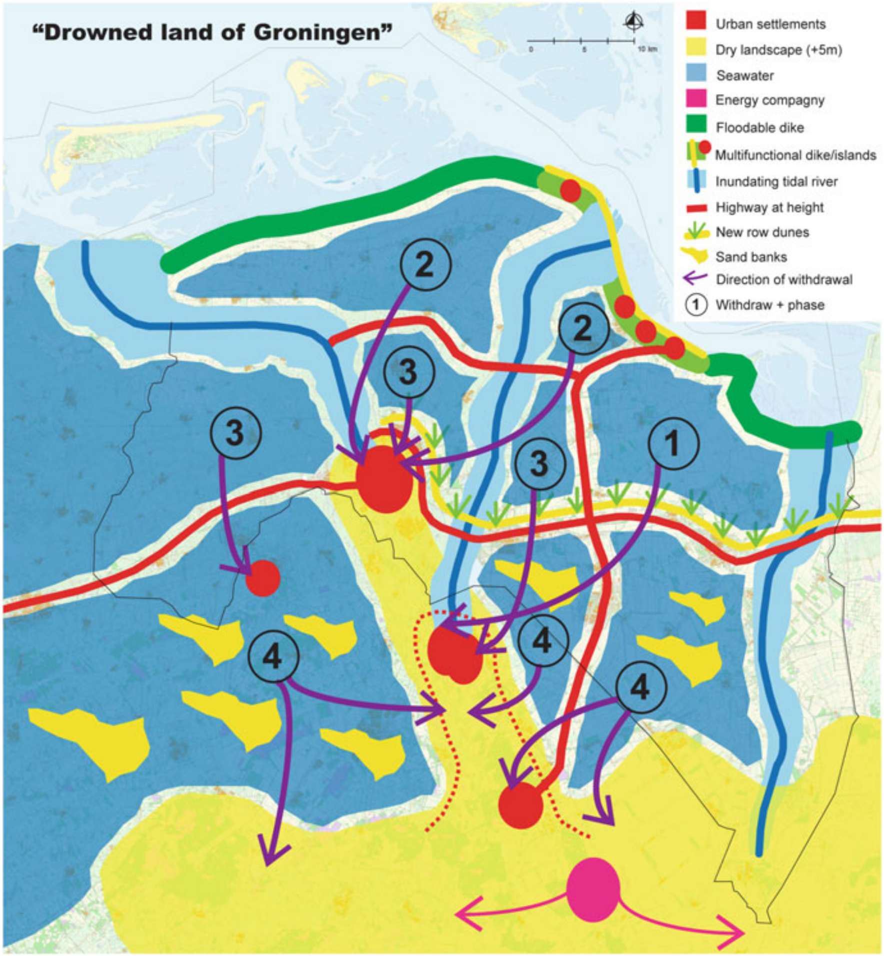

Fig. 8.21 The 'Drowned land of Groningen' scenario (Van 't Klooster et al. 2008)

risen compartments lead to a landscape that is entirely heightened and safe. During this process people are encouraged to move their houses to the freshly elevated areas to stay safe for the longer term. Centrally located in the province a retention basin is projected, which will be filled during the winter period with excess rainwater. This basin provides fresh and clean water for residential, agricultural and industrial use. The projected super-dike, an extra wide dike that cannot breach, along the coast not only protects the Hinterland but also offers the opportunity to locate wind-turbines and solar farms on it. More innovative ways to generate energy are the development of algae basins in the brackish water and placing hydropower turbines where seawater enters the compartments.

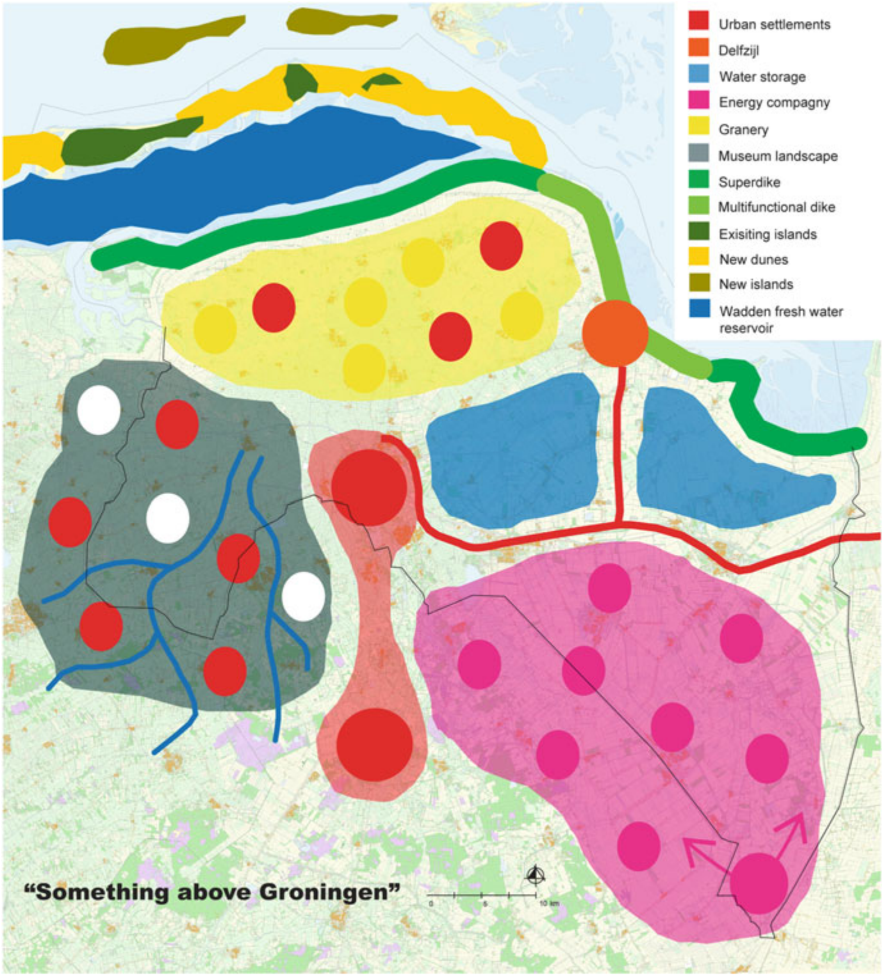

Fig. 8.22 The 'Something above Groningen' scenario (Van 't Klooster et al. 2008)

8.6.8 Integrated Map

The series of design charrettes contemplating the most optimal climate adaptation for each thematic land-use each delivered, at least one, map. The combinatory of these maps built up the Integral Adaptation Map (Fig. 8.24) through overlaying the maps of water and ecology, water supply, agriculture, energy and the coast (Jacobs et al. 2009). The results of the agriculture charrette were taken as the basis because it occupies the largest areas. After agriculture, the results of the ecology and water charrettes were added, followed by the maps on which the coastal and water storage results are comprehended. Finally, the energy and water supply maps complete, supplemented with existing and projected housing, the picture.

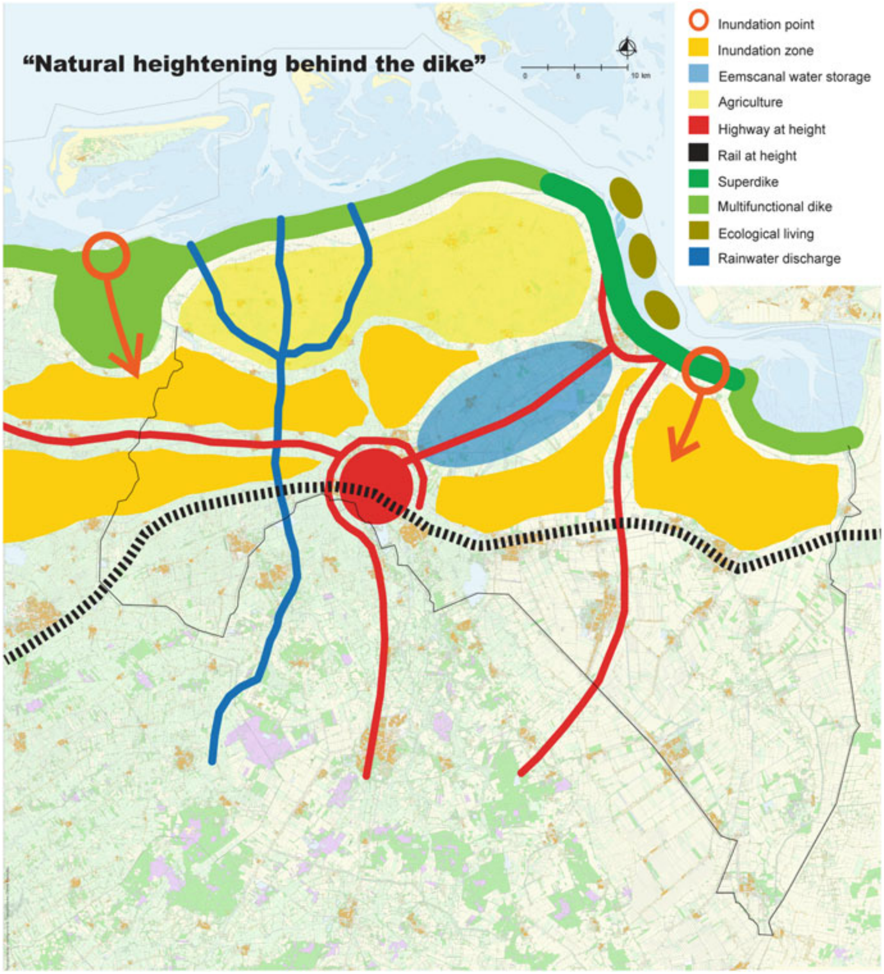

Fig. 8.23 The 'Natural Heightening behind the Dike' scenario (Van 't Klooster et al. 2008)

8.6.9 Detailed Designs

When the Integrated Adaptation Map is subsequently confronted with the three scenarios (see Sect. 8.6.7) for large areas of the province it is completely clear what policy enhances climate adaptation, the robust policy areas (Jacobs et al. 2009). However there are several other areas where it is not crisp and clear what the best adaptation policy is. These 'Windows of Groningen' require a intensified and closer design to determine what the best policy is. Six specific problems have been identified and provided with a detailed design.

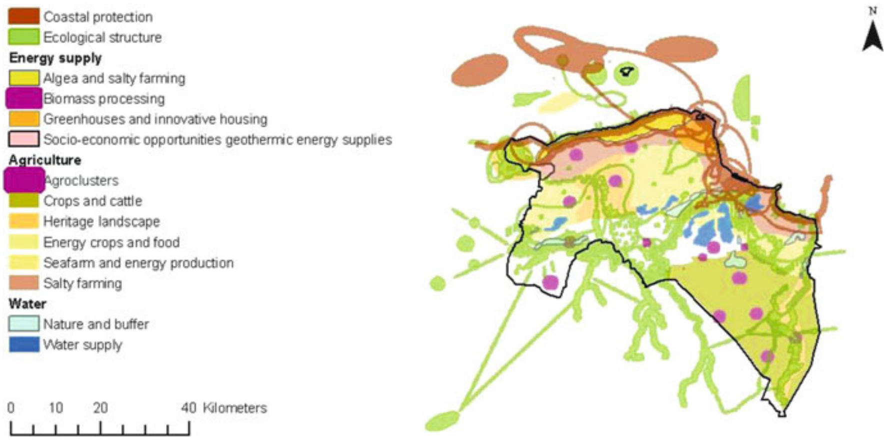

Fig. 8.24 The integrated adaptation map for Groningen (Jacobs et al. 2009)

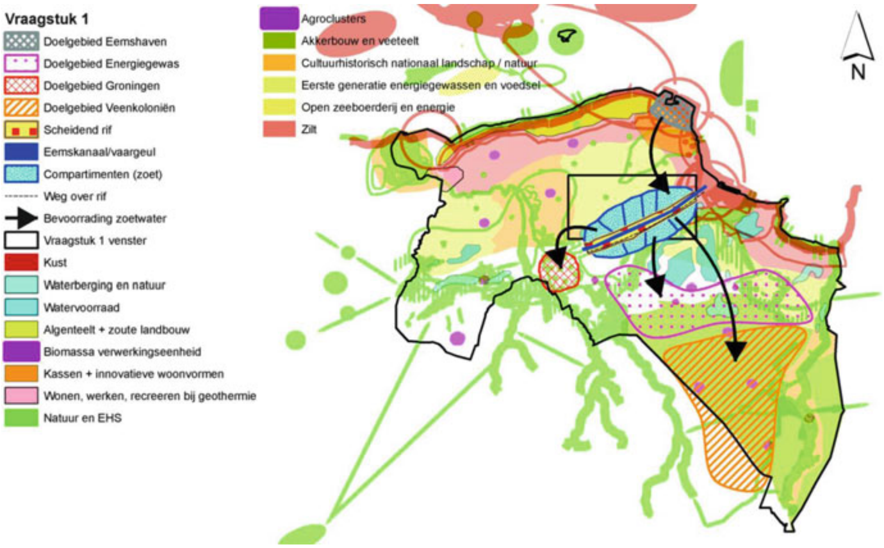

Fig. 8.25 The 'Eems Canal water reservoir' detailed design (Jacobs et al. 2009)

1. **Eems Canal water reservoir**
   The water reservoir, proposed in the 'Natural Heightening' scenario, will take substantial space from other land-uses in the area. Therefore, the new Lake needs to bring about other valuable assets for the area, both in terms of adapting to climate change as well as in added economic values of new land-use functions.

   The Eems Canal cuts through the new 'Eems Lake' (Fig. 8.25). Along the canal a reef is erected on which housing and a road are constructed. The Eems

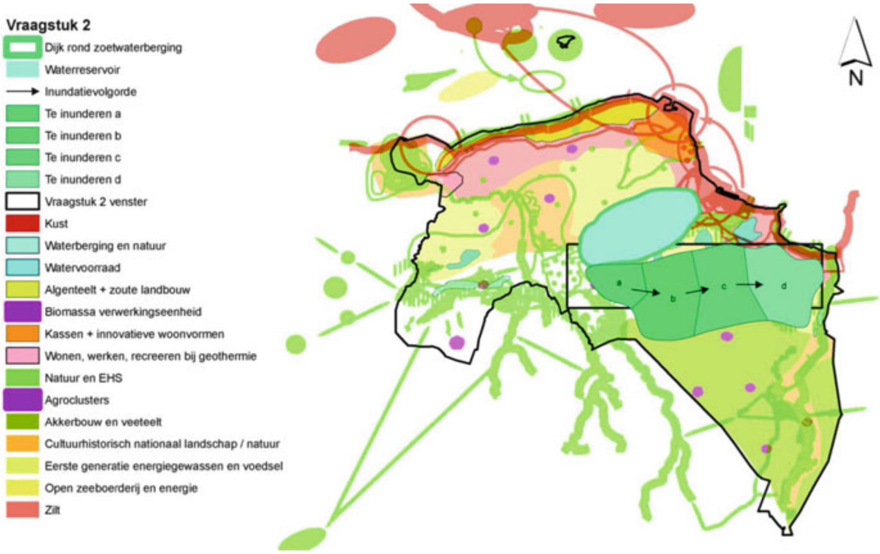

Fig. 8.26 The 'Dollard-City' detailed design (Jacobs et al. 2009)

Lake is compartmented and deepened below groundwater level and therefore always contains water. The Lake is filled with rainwater and each compartment is linked with a target area to which will deliver water in the future. The four compartments deliver water to the City of Groningen, the Eems harbour, the Energy Crops area and the Peat Colonies respectively. In the compartments residential houses are built in a completely flood-proof way. Each compartment is open to sponsoring, providing the sponsor with the guarantee to use water from a specific compartment. The northern part of the lake is a primary supplier of water, while the southern compartments are only used in extremely dry periods. In normal circumstances this part of the lake serves as counter-pressure to the salt seepage coming from the southerly saline inundation area. The lake is estimated to be big enough to operate as freshwater supply for the region and makes external supply superfluous.

2. **Dollard-City**

The inundation as proposed in the 'Natural Heightening' scenario requires from several land-use functions to relocate temporarily. Therefore, the rising of the surface level needs to provide new opportunities for agriculture and residential living to improve their safety and property value, and more efficient crop technologies.

In this design the inundation of seawater can enter a restricted area, located south of the proposed Eems Lake (Fig. 8.26). By means of natural processes the lowest parts of this inundated area will fill up first and therefore start the land-forming process first. This lowest lying area is located closest to the capital of Groningen in the eastern part of the inundation zone. After a while, when

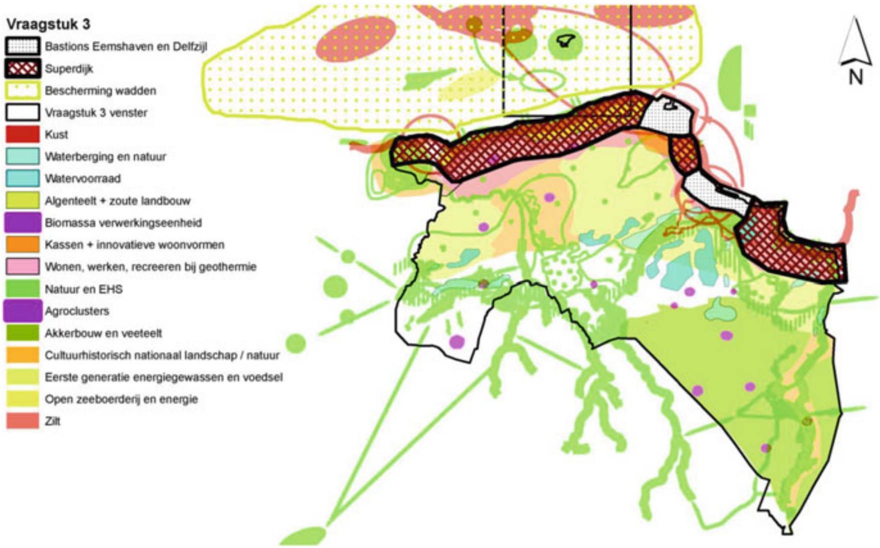

Fig. 8.27 The 'Fore-Wadden' detailed design (Jacobs et al. 2009)

the land surface is heightened to prevent flooding, in the second part of the inundation zone sedimentation processes start and progressively will form a new, heightened, landscape. Beside the natural process of filling up the basins, another reason lies in the fact that the first area to become safe for flooding is closest to the main inhabited areas. Where land is elevated new urban developments can be undertaken.

The inundation areas form a very functional adaptation in the long term. In these areas no water storage is needed anymore because much water is stored in the ground. During the inundation water, rich in salt and sediments, flows over the land. In this period no traditional farming is possible (too salt conditions), but a dynamic saline environment allows alternative forms of agriculture, algae or aquacultures, to take over. After this period traditional agriculture takes over again and the inundation process shifts to the next compartment.

3. **The Fore-Wadden**
Derived from the 'Something Above' scenario, the coastal defence to the North of the Groningen coast needs to be enforced by creating a new row of barrier islands (the Fore-Wadden), by closing off the Wadden Sea through connecting the existing barrier islands with dunes and by realising a widened dike along the current coastline (Fig. 8.27). In case of extreme sea level rise these kinds of measures come into play, but at the current pace of change they seem to be extravagant. However, these measures take a long time to realise hence they should be started early, probably earlier than decision-makers are 'ripe' for it to decide.

In case of rapid sea level rise the Wadden as they appear at present times will disappear. When Fore-Wadden are created in front of the existing, a new mudflat

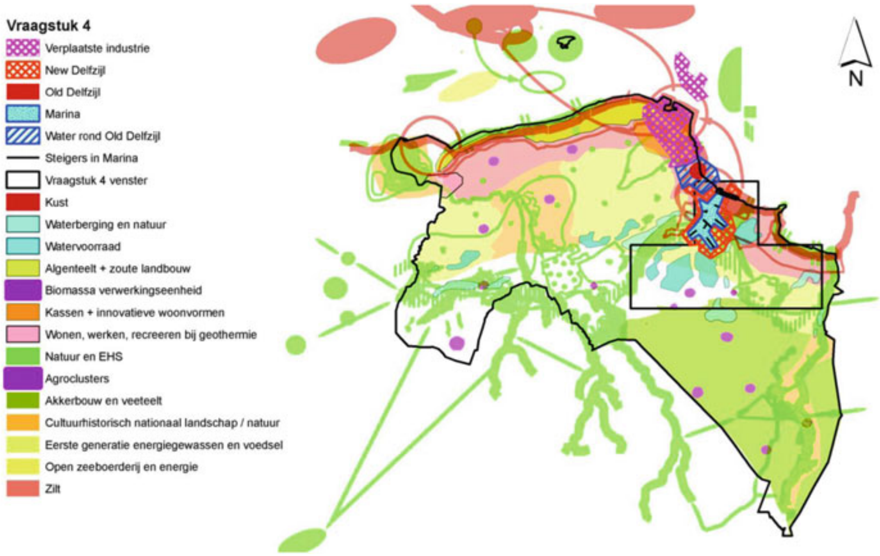

Fig. 8.28 The 'Delfzijl-South' detailed design (Jacobs et al. 2009)

is developing, and new Wadden are created, while the former Wadden Sea is turned into a freshwater reservoir when they are connected through a continuous row of dunes in between of them. These new islands help to slow down wave attacks in times of a storm surge, which protects the current landscape. The coastal defence is completed with a widened dike, which cannot break through. This design has several advantages. First, the freshwater-reservoir provides the region, and beyond, with clean and abundant fresh water. Secondly, the new islands create a valuable wetland environment behind them and can be used themselves for recreational, urban and agricultural land-uses, giving space to the highly contained land-use in the Netherlands. Finally, this set of layered defences protects the existing landscape, even under extreme fast sea level rise. In the present timeframe, to give up the existing Wadden seems to be a political bridge too, but in case of rapid sea level rise (1.5 m per century or more) 'something' needs to happen above Groningen. In such a future, doing nothing is not an option.

4. **Delfzijl-South**
   Part of the protective broad dike, as proposed in the 'Something Above' scenario is the Eems Harbour-Delfzijl corridor. In this area several spatial claims fight for space: urban expansion, water storage and nature reserves all have valid claims. In this design these different claims are integrated and improve the entire quality in the area.

   The rapidly melting icecaps of the North Pole open up a new opportunity for Delfzijl (Fig. 8.28). The route over the North Pole becomes an interesting possibility for cruise ships. And it creates a new position for Delfzijl. From a small,

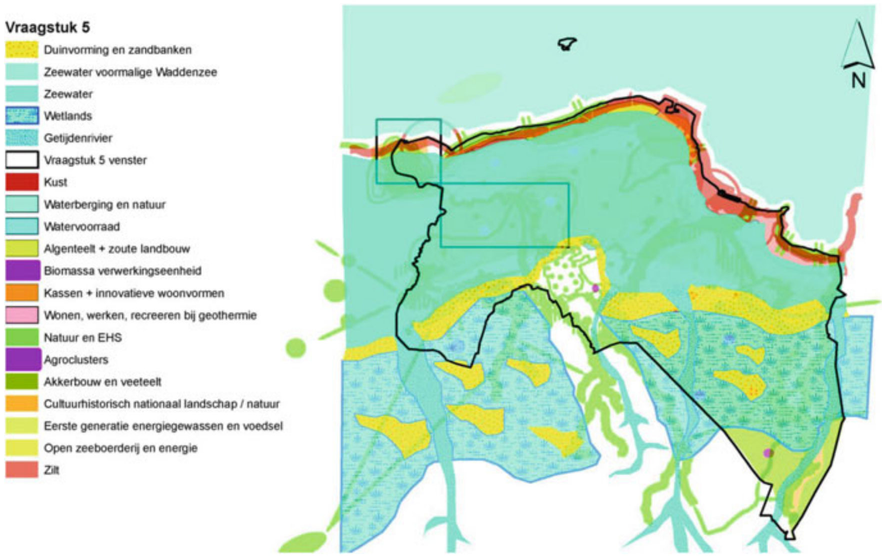

Fig. 8.29 The 'Tidal Rivers' detailed design (Jacobs et al. 2009)

back-dropped town on the shores of the Eems it suddenly becomes one of the first Port to visit when sailing across the Pole from the North. By accident, Delfzijl becomes the Ushuaia of the northern hemisphere. In order to create an attractive harbour city, suitable for visiting cruise ships, large parts of existing Delfzijl are pulled down and Old-Delfzijl is restored and partly rebuild as an historic town around an inland pleasure harbour where the nightlife, culture and leisure and shopping, are top-class. The harbour functions also as water storage and new houses, floating and on piles, and the nature reserve are allocated around it. Industry is relocated in the Eems Harbour. Sustainable heat and electricity is supplied from the over-production in the Eems harbour.

5. **Tidal rivers**

   The 'Drowned Land' scenario implies that large parts of the existing landscape are relinquished and given back to the Sea. This creates a new dynamic landscape in which tidal rivers dominate natural processes of erosion, sedimentation and land forming. Two old tidal rivers, the Reitdiep and the Fivel can regain their old functioning. These old new rivers carry salt water and transport it deep inland.

   When seawater is flooding the existing landscape (Fig. 8.29), the natural processes will take place that earlier determined the development of the Wadden Sea. This means that large parts of the existing landscape will turn into mudflats with the dynamics of incoming and leaving seawater, which enhance processes of erosion and sedimentation with gullies, shallows and sandbanks, which are dry at times, and periodical floods. The old rivers become tidal, which means they cut deep into the existing landscape and stream of the gentle slopes of the Drenthe Plateau. The rivers bring a salt environment deep into the Hinterland, allowing for

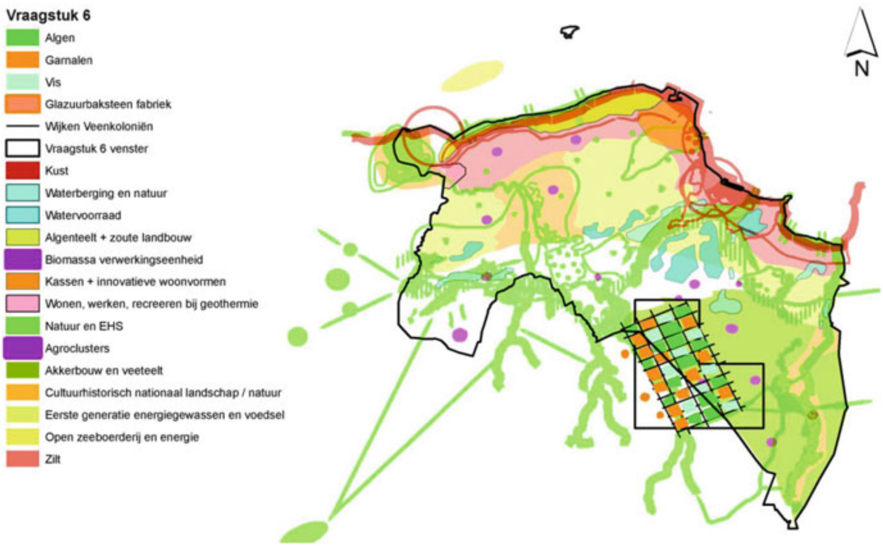

Fig. 8.30 The 'Seawater in Peat Colonies' detailed design (Jacobs et al. 2009)

valuable salt-brackish-fresh gradients of nature to develop. To relinquish the land places authorities for a dilemma. Do they step back, 'do nothing' and let it happen? Or do they 'manage' the flood against high costs? Or, a third approach might be to defend the coast against all futures, which is also costly. Moreover, if retreat is a serious option who dares to be the first politician to make that public?

6. **Seawater in Peat Colonies**

The 'Drowned Land' scenario implies seawater to penetrate deep in the Hinterland, until an elevation in the landscape comparable with the sea level rise. This means that the Peat Colonies in the south of the region will be easily reached. Seawater replaces current or projected land use, such as energy crops, spatial claims that need to be united.

When seawater reaches the Peat Colonies the existing landscape needs to be redeveloped (Fig. 8.30). The old rectangular landscape compartments form the basis for a process of inversion. The old canals form the strongest structures and form higher dikes in between which the land inclines. This forms new compartments, which are filled by seawater in a pattern of fish farms and algae basins. The algae produce proteins, fertilizers and biodiesel. When the landscape floods, fine saline silt is deposited in the compartments. When the compartments are 'full' this silt can be used to bake glazed bricks in ovens, which are fired by the biodiesel from the algae and wind turbines, which are placed in between the compartments. The bricks can subsequently be used for the building of houses in the region. When the compartments are empty the production of fish and algae starts again. The compartments subsequently operate as fish farm, algae basin or sediment depot. This ensures a continuous production of fish, biodiesel and bricks.

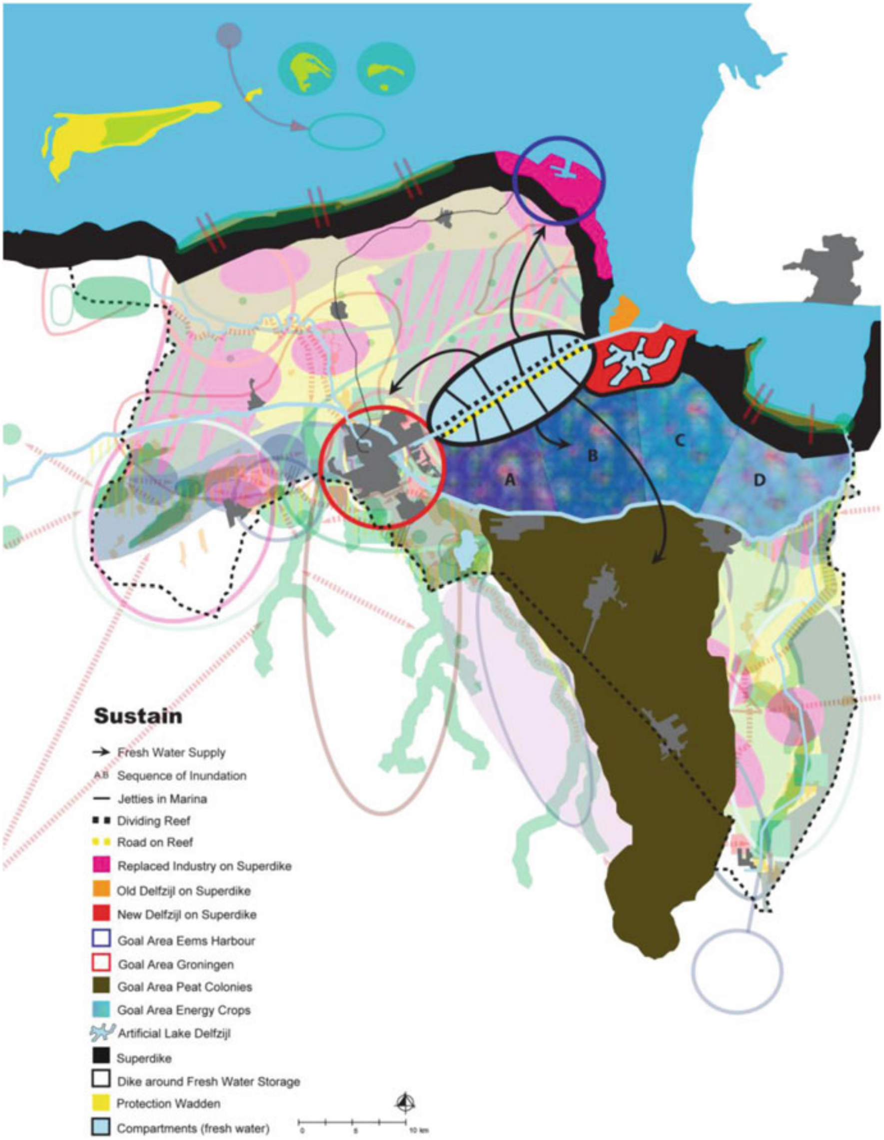

Fig. 8.31 Future vision 'Sustain' (Roggema 2009)

8.6.10 Integrated Future Visions

Based on the Integrated Adaptation Map, the three scenarios and the detailed designs two fundamentally different future visions for a climate proof Groningen were designed: Sustain and Relinquish (Jacobs et al. 2009).

The 'Sustain' scenario (Fig. 8.31) assumes that Groningen defends itself tooth and nail against changes, including in the event of a great and accelerating rise in sea level. To this scenario belongs the supplying of the Wadden system with sand in a way that its present protective role before the coast is preserved. Moreover, along the length of the coast, a widened dike zone is projected, which cannot breach and is high enough to withstand high sea levels and high wave energy in case of storm surges. On this dike zone the Eems Harbour and the old and new Delfzijl are reconstructed, combining the industrial activities of Delfzijl and of the Eems Harbour. Behind the dike low-lying landscapes are periodically raised in a natural way through sedimentation from seawater, beginning near the city of Groningen. A communal water reservoir comes into being in the centre of this area, which supplies its target areas with fresh water, even in dry summers. The agriculture along the coast becomes saline and there is space for the cultivation of algae, while farming in the Peat Colonies consists of arable farming, stockbreeding and energy crops, with agro-clusters and sustainable greenhouses at specific locations.

Relinquish, the second scenario (Fig. 8.32) assumes in case of extremely rapid sea level rise saving the land is no option. In this case valuable functions must be safeguarded either by locating them at places not threatened by seawater, e.g. above 5 m, or by making them robust enough to survive the higher sea, which turns places, such as the Eems Harbour and Delfzijl harbour into sole islands. At the base of 5-m elevation a new Wadden system develops, where shallows occur that are sometimes dry, and where dune and island formation takes place. This new fore front of mudflats offers the necessary protection against storms and attacks by waves from the sea. Tidal rivers come into being, which flow from the Drenthe plateau and are linked in a natural way with the sea. In the new sea, which periodically is under water, aquacultures of algae, fish and shrimps are developed. The silt, which deposits sediments is excavated and used in new brick factories to make glazed bricks. At sea, open sea-farms are proposed. Residential housing and other economic functions retreat to the higher plateau.

The two scenarios indicate utmost limits of possible climate-proof futures for the Groningen region. They seem extreme and yet it is not impossible that scenarios and choices of such a great impact are discussed in the course of the century.

The protection of the population before a serious disaster takes place is important. However, at what moment the urgency is large enough to make these scenarios realistic. And subsequently, how far in advance must anticipatory measures be conceived, proposed and implemented? Even if that moment is still years away from now, a start can already be made with robust measures, which fit into both scenarios.

8.6.11 On-Going Projects

In the sequel of the hotspot climate proof Groningen design charrettes the developed knowledge is applied at a lower spatial scale in two areas: the Eemsdelta and the Peat Colonies. In both areas anticipative designs have been conveyed in settings that are very similar to the design charrettes as conducted in the Groningen process. In the Eemsdelta case study, an artificial opening in the dike enforced the Hinterland

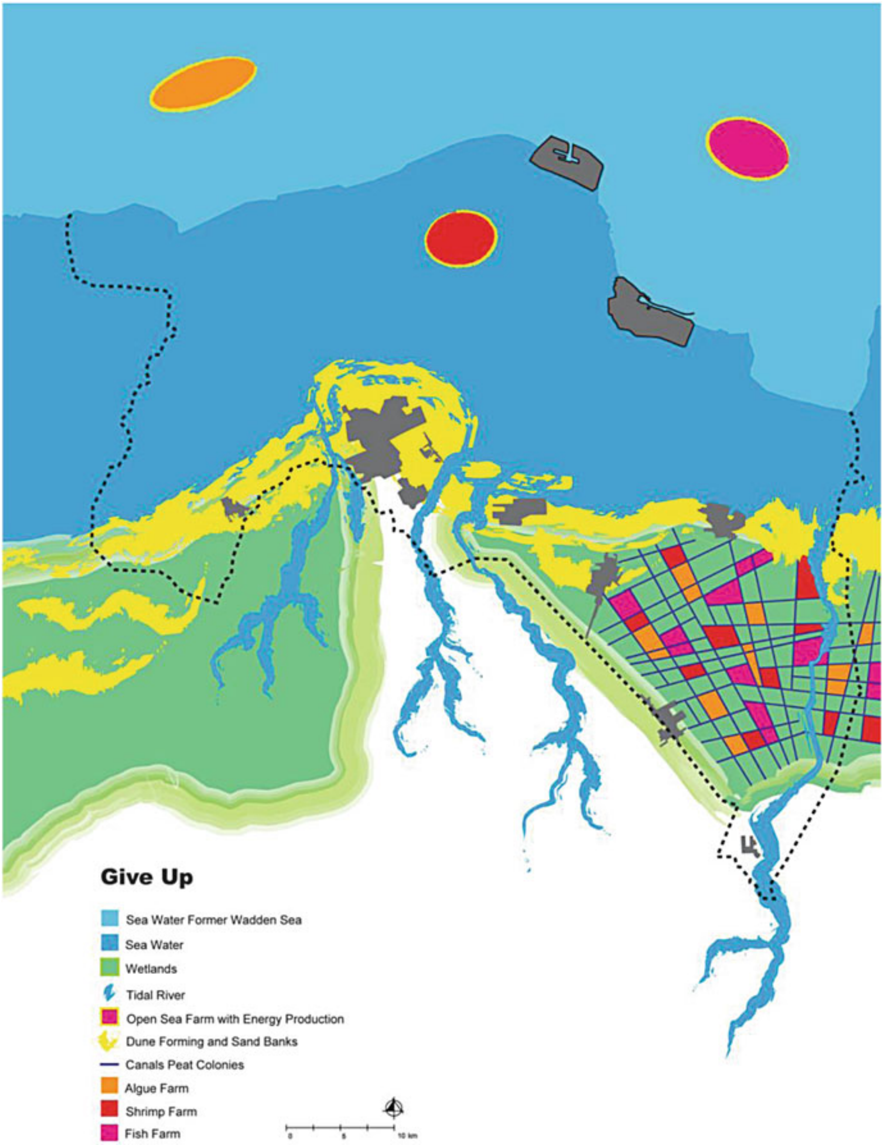

Fig. 8.32 Future vision 'Relinquish' (Roggema 2009)

to anticipate future change of intruding sweater, creating a design that appreciates the appearance of water and creates a safe living environment (Roggema 2011, 2012). In the Peat Colonies a renewable energy supply forms the basis for the regional design, which takes the networks of water, transport and energy as a starting point of new systemic and urban development (Broersma et al. 2011; Roggema and Stremke 2012; Roggema and Van den Dobbelsteen 2012; Roggema et al. 2012).

Both design amplify thinking of designing landscapes for future climatic change, whilst anticipating unprecedented climate events and hazards.

8.7 Success Factors

The process of designing a climate proof future for Groningen process was complex and lasted for a long time. Several success factors stood out. First of all, the process brought together academics and policy makers. They were not put in a room and having a meeting, or, even worse, the academics were not asked to deliver research in a report which is delivered to policymakers, but academics and policymakers were placed around the table where they needed to participate actively in the design process of the charrette. The so-called science-policy interface (Hinkel 2011; Wardekker et al. 2008; Watson 2005) was not limited to an academic exchange of information, but took place real time with active participants. This approach proved the commitment of academics to bring in their knowledge in a policy-oriented process, the abundance of locally apparent knowledge and the usefulness in design processes of the contributions of academics, local experts and policy makers. The success of this integration and newly developed knowledge was strongly supported by the contribution of departments within the province of Groningen, the external institutions and experts in the respective fields that contributed free of interest and charge. An important part in the success of the process was the unconditional support of the knowledge program 'Climate Changes Spatial Planning'. Without the network of the program, connections with the academics with relevant expertise would have been difficult. Also, the exchange with other projects and the program direction proved valuable in executing the design process. The project was managed from the province of Groningen. A tiny program management team led the project. The driving force of few individuals made the success of the process. The fact this team was small in size proved a highly efficient operation, but lacked the weight to impact regional policies for a prolonged period. This became especially visible after the project manager left and there was no framework within which the work could be continued. In extension of the hotspot process an, already strong, sustainable energy program continued to operate in the context of the Northern Netherlands, leading to the energy agreement with the national government and the New Green Deal between energy Valley and the national government (SER-NN 2011). Finally, thinking about the long-term sustainable future of the Northern Netherlands started with projects such as the Hotspot Climate Proof Groningen, Grounds for Change (Chap. 9) and INCREASE (Chap. 5), but continues with initiatives to design a climate adaptive future for the Peat Colonies in the EO Wijers competition (www.eowijers.nl, www.veenkolonien.nl) and the project Noordervisie 2040 (www.noordervisie2040.nl).

During the process high-level learning took place. The process of subsequent design charrettes, which each was designed as a collaborative and collective process, left room for reflection and evaluation during the running of the project. The

	Individual or collective learning	Nature of learning domain	Kolb experimental learning cycle	Depth of learning impact
Distributive	Individual	Tame problems Technical challenges	Conceptualisa-tion only	First level learning
Interactive	Individual	Tame problems Technical challenges	Conceptualisa-tion and experimenting with new behaviour	First or second learning level
Collaborative	Collective and individual	Wicked problems Adaptive challenges	All stages of cycle (and multiple times)	Third learning level

Fig. 8.33 Learning in the hotspot climate proof Groningen

thematic focus of the project lied on identifying solutions and strategies for wicked problems and defining an adaptive future for the province of Groningen. Many design charrettes emphasised the conceptualisation and experimentation with new attitudes, experimentation and reflection during these processes: learning at the third level (Fig. 8.33).

8.8 Groningen in the Charrette Wheel

When the hotspot Groningen is positioned in the design charrette wheel (Fig. 8.34) it is obvious that the project took place in a country belonging to the developed world and was conducted at the regional (provincial) level. The subjects discussed, designed and researched can be characterised as rural with linkages to the peri-urban. The inter-linkages between subjects, integrations and the objective to design a future for the region, which improved the climate adaptive quality of the region, made it a complex process. Finally, a wide range of participants took part in the different design charrettes and the integration and project meetings. Academics, government representatives, students, local experts and designers comprehensively shared their expertise and knowledge for the benefit of the project.

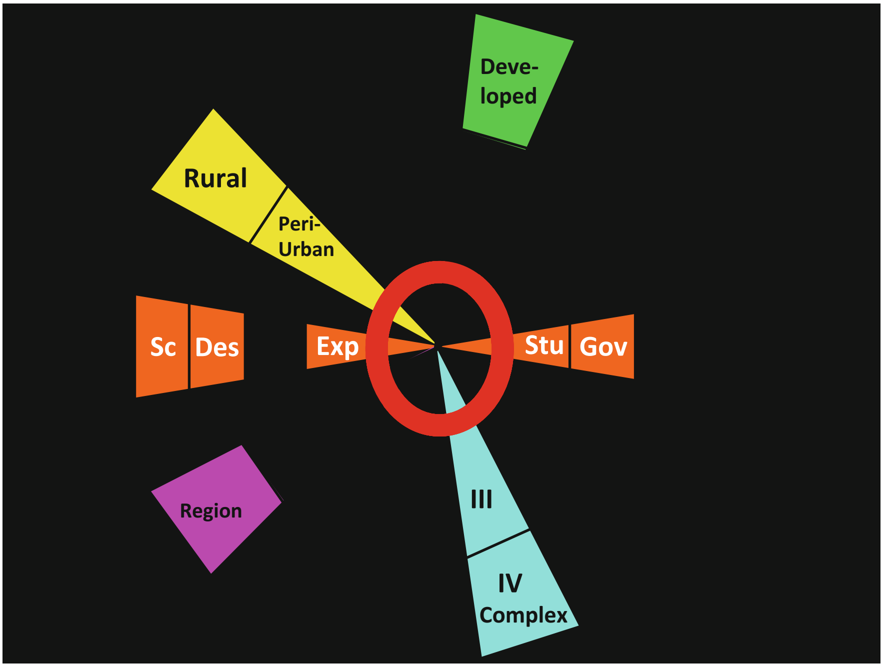

Fig. 8.34 The charrette wheel for the hotspot Groningen

8.9 Conclusion

The province of Groningen was the first province in the Netherlands to integrate the policy-fields of water, environment, traffic and space. In the period 2007–2009 it became the frontrunner to integrate climate adaptation issues in spatial planning processes. The constraints of everyday politics could not stand in the way of finding innovative solutions for a pressing, but not always experiences as pressing, problem: the impacts of future climate change. In the process at several moments an extreme future change was taken as the starting point for discussion and debate. Some people expressed concerns with taking this approach. It scares people and it is not realistic. However, there were good reasons to use extreme scenarios. In the scientific literature at that time there were already articles pointing at a serious more extreme climate future than the politically agreed two degrees warming. There were also many scholars, such as Jim Hansen and Laurens Hacquebord, who warned for the possibility sea level might rise with an accelerated pace and much faster than many could imagine at that time. The scenarios were experienced as extreme, but after looking carefully in the literature, they could be a reality over a not to far future ahead. Secondly, the reason to take extreme scenarios as starting points for design and debate lied in the assumption that people, when confronted with a question to design a climate adaptive future for these extremes, couldn't possibly respond with unchanged policy proposals. Everyone needed to stretch their thinking in designing a future that could be realistic under these, so-called and so-experienced, extremes of that time.

It had two consequences. The first effect was a well-planned and desired effect. It seduced people, who normally were employed to avoid risky proposals, to collaboratively think beyond their boundaries. New plans and design were the result and many of the outcomes are still seen as innovative and ground-breaking. The other effect was however that many of the proposals, meant for the longer term, did not comply with the requirements of present requirements and the, sometimes ad-hoc, political reality. This undesirable effect necessitated that much of the ideas and thinking was finally reported in the form of academic articles and PhD-research, but it merely became instant new policy.

In two ways the hotspot Groningen was specifically rewarded for: its organisation of creative thinking about the future, and the fact that the entire network of stakeholders were part of the process (De Pater et al. 2010).

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Chapter 9
Grounds for Change: Sustainable Energy Futures

Rob Roggema and Andy van den Dobbelsteen

9.1 Introduction

Spatial design and sustainable energy systems are two worlds apart. It is assumed that the energy system can be technically arranged for without influencing the spatial designs of regions, cities and neighbourhoods. Moreover, from an energy system point of view it is regular policy to formulate the conditions to which spatial plans must obey. From an historic perspective this is understandable. The energy came from below ground level or from far away and needed to be transported through grids towards households and industries where it'd be used. In the case of using renewable resources to supply the energy, this is mostly harvested at the ground level, whether it is biomass, wind turbines or solar farms. Moreover, these sources are produced locally, which means that they have a visual impact and affect local land-use. This makes a good case at aiming to bridge energy supply and spatial design. 'Grounds for Change' has declared this as its major objective. Its preferential way of working is found in executing design charrettes at different scales and in different contexts. The origin for Grounds for Change dates back to the special project of the International Gas Union (IGU), as presented during the 22nd World Gas Conference in Tokyo, 2003. This project, entitled 'Proposals for the International Competition of Sustainable Urban Systems Design' (Ito 2003), reports the submissions of

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international combined design and energy teams to propose integrated models for urban environments to become more sustainable, taking the energy supply as a major starting point of thinking. In the aftermath of the competition, won by the Vancouver team, the idea rose to start a follow up project, which emphasises collaboration rather than competition in developing sustainable solutions for energy conscious regions. In this 'Bridging to the Future' project four teams from Canada, India, China and the Netherlands took up the challenge. The Dutch project is called Grounds for Change and focuses on designing a sustainable energy supply for the North Netherlands region. The Chinese team developed designs for the Western Qingpu District, west of Shanghai, with the town of Jinze as the key village in the area. Both projects organised design charrettes, one in Groningen and one in Jinze Town.

9.2 North Netherlands and Jinze

The three Northern provinces of the Netherlands are united in Energy Valley (Fig. 9.1). This acknowledges the collaboration between the three in developing an economically prosperous and sustainable energy landscape. However, geographically, the provinces Drenthe, Fryslân and Groningen differ. Fryslân and Groningen face the Wadden Sea to the north and the majority of their landscapes are water-rich and below sea level, while Drenthe is landlocked and largely above sea level. Where Drenthe has almost no surface water, Fryslân is known for its abundance of lakes and canals. The province of Drenthe contains a lot of forests and Groningen and eastern Drenthe have large agricultural industries like sugar refineries and potato-starch-factories. Main agricultural activity in Fryslân is dairy farming.

The province of Groningen holds an extensive chemical industry complex in the harbour of Delfzijl. This complex is based on three geological features: natural gas, sodium and magnesium salts, and deep-sea access. The extraction of the natural gas fields in Groningen began in the early 1960s. Since then gas export and internal supply led to substantial tax revenues for the national government. It also resulted in employment growth in energy intensive industries, such as aluminium, silicon carbide, magnesium chloride and petrochemicals, in Delfzijl. Moreover, the surpluses of revenues were used to support the striking architecture of the Groningen Museum and the Gasunie Headquarters, which reconfirmed symbolically the iconic role of natural gas in economic wealth. This caused the Northern Netherlands to be considered as the excellent case to use in the Bridging to the Future project, underpinned by the following arguments:

- The presence of a powerful cluster of energy (related) companies in the region and the Energy Valley initiative, both initiating and accelerating further economic development in the region;
- The presence of the University of Groningen, notably the Centre for Energy and Environmental Studies and the Faculty of Spatial Sciences;
- The presence of the Energy Delta Institute, in which both academic and gas industry-based knowledge about energy and gas have been combined;

Fig. 9.1 The northern provinces united in Energy Valley

- Local and regional governments, firms and private parties are already working together in ambitious programs aimed at increasing economic development;
- Western Europe's largest natural gas reserves are located in the region.

At the same time the region is increasingly facing high risks (Roggema 2005). Over the next decades a couple of developments impact Northern Netherlands. The surface is subsiding while sea level rises. The availability of natural gas decreases. Due to the economic balance shifting towards countries, such as India and China, financial reserves decrease in peripheral regions. Therefore, the protection against floods and severe storms becomes more difficult less. Fossil fuel and clean drinking water become increasingly scarce. This makes it necessary to develop innovative plans that respond to these developments. In current times people, policymakers, designers and politicians believe that the money will be available now and in the future to technically tackle the problems. However, within 30 years from now depletion of natural resources and climate impacts urge to define our spatial responses in a fundamental different way. This is not only a threat. It can also become a trigger and stimulus for new approaches and solutions. This however requires new ways to look at solving problems.

The Chinese region of the Qingpu district differs but also shows similarities with the Dutch case study. Qingpu district is one of 20 districts, which together form the province of Shanghai (Fig. 9.2).

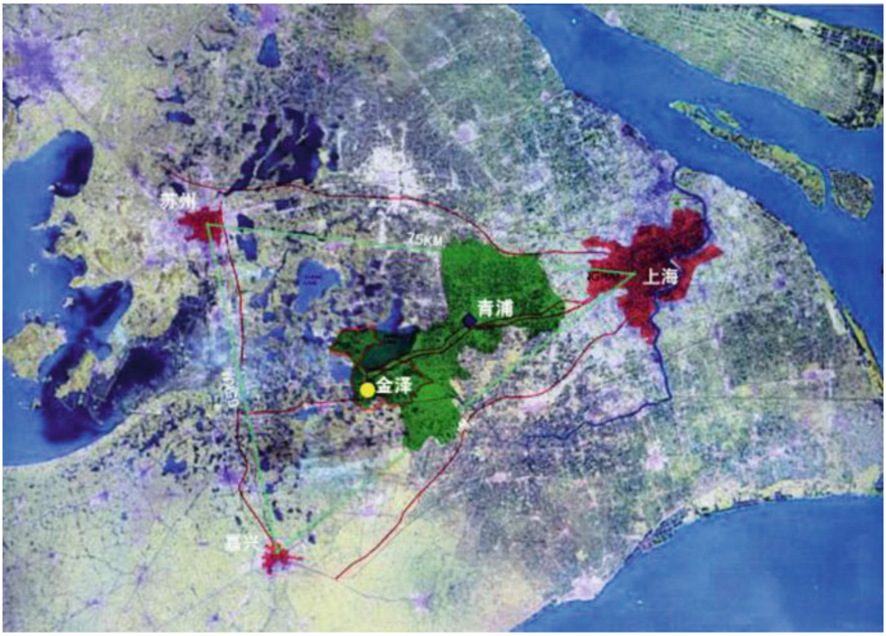


Fig. 9.2 Jinze Town and Qingpu District situated in Shanghai province (Qingpu District 2005)

The district is a suburban growth centre containing eight towns and covering a total area of 670 km^2, of which 17 % is water. A rapid growth is expected in Qingpu, fuelled by population pressure, and new transportation links with Shanghai. It also brings environmental problems. Presently, the district is an attractive enclave, in which a large lake is located in the northwest: Dingshanhu. The district contains 27,305 ha of cultivated land. The land has been farmed for approximately 5,000 years, and some of the *weis* – or water containment structures – date back 2,500 years. Climate is subtropical, with seasonal monsoons and prevailing South-westerly winds. The land is predominantly flat, with an elevation of about 3–4 m above sea level. With an annual average temperature of 15.5 and a yearly rainfall of 1,056 mm, which falls mainly in summer and autumn, water is abundant and feeds the multiplicity of lakes and canals.

Jinze Town is situated close to the Taihu Lake and the Huangpo River, in the midst of a wide spread district full of lakes and rivers (Fig. 9.3). About 26.4 % of Jinze's total area is water. The town is divided in seven dike districts, which cover a total of 4,700 ha of fertile and conveniently irrigated land. Jinze Town is the most famous tourist attraction within Qingpu District due to its collection of heritage bridges and waterways. Jinze Town has recently finished an amalgamation with surrounding wetlands and agricultural areas, resulting in an enlarged area of 80 km^2, of which one third is water. The population of Jinze Town and surrounding area is approximately 60,000 people, comprising about 10 % of the total for Qingpu District.

Master planning for Jinze Town needs to embrace the designated heritage site, and comply with enhancing cultural and environmental qualities.

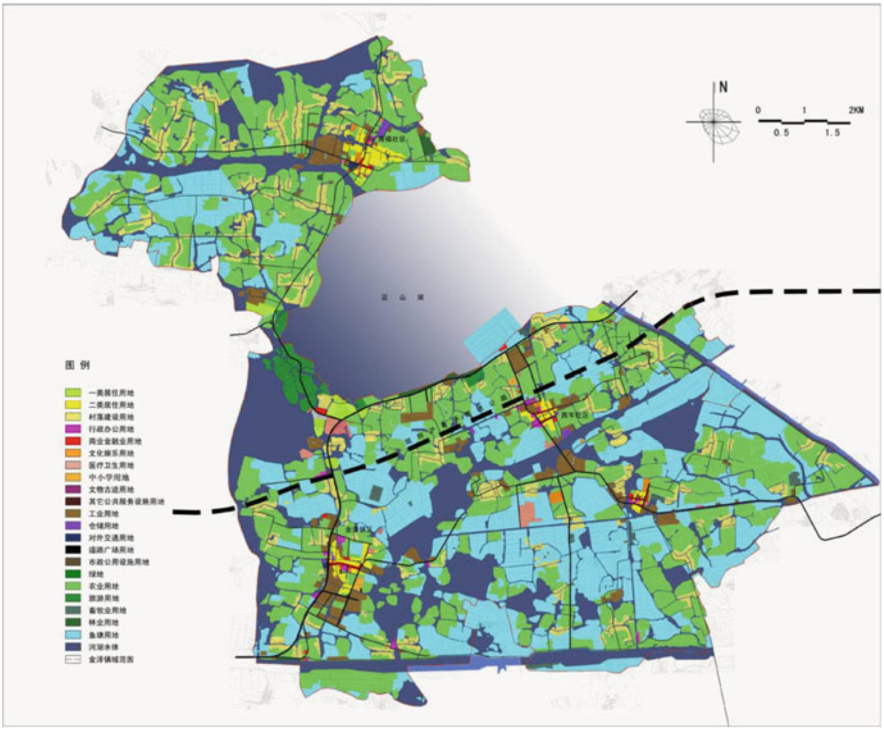


Fig. 9.3 Jinze Town, consisting of water, wetlands, ponds, agricultural land and built-up heritage sites (Qingpu District 2005)

9.3 Sustainable Energy Futures

The objective for the two Bridging to the Future design charrettes in Jinze and Grounds for Change is to combine new planning concepts, based on longer-term time horizons, with concrete, present day solutions for a sustainable energy future. Therefore it is needed to bridge energy planning and spatial design strategies. This implies thinking or re-thinking the future. The ambition is to include long-term views, different time horizons and spatial scales, from a specific sustainable energy perspective, in the decision-making process.

A specific aspect of the charrettes is the 30-year time horizon, which is much longer than typical plans for urban systems. Although looking so far forward increases complexity and uncertainty, it also provides potential benefits. The most significant benefits of the long-term approach are (Moffatt 2005):

- A process that is based more on values than on protecting interests, and as a consequence is more inclusive and positive;
- An ability to consider major changes to slow-moving elements of regions, such as land-use and infrastructure, and to find more elegant and efficient solutions at the 'whole system' level;

- Life cycle costing for long-lived investments such as transportation corridors;
- Clarification of major trends such as decarbonisation of energy sources, increased flexibility and control, and dematerialization, that are reshaping energy systems and ultimately creating major threats and opportunities for cities;
- The identification of major forces, such as climate change, demographics, globalization and resource scarcities, that are largely external to the regional plans, but that are likely to impact regional plans;
- The opportunity to 'back-cast' a pathway to sustainability, by first defining specific end-state conditions or goals, and then describing critical – but manageable – transition steps, starting today.

The following concrete objectives for the design charrettes were formulated (Van Dam and Noorman 2005):

1. To integrate Energy Planning and Regional planning.
   Designing pathways towards a sustainable energy system is not an isolated exercise. Developments in the demand and supply of energy are interlinked with the build environment. Moreover, rural planning is also important to the way energy can be produced. As a result, both urbanized areas (as a mal) and rural areas (as a contra mal) are interwoven with energy planning. This demands planning to become integrative and innovative planning.
2. To facilitate knowledge transfer.
   Newly developed planning concepts can be applied in new strategies for (sub) urban regions. As such these new insights are transferred to energy and urban planners.
3. Facilitate regional policy-making
   Developing and designing a sustainable energy future for a region delivers images, strategies and measures on a regional scale. In policy the majority of instruments are applied at lower scales. The objective in the design charrettes is therefore to identify the accompanying regional policy instruments that, together with the designs at the regional level, facilitate regional decision-making.
4. Promote natural gas as a transition fuel
   Natural gas is regarded as an important transition fuel in a transition towards a fully sustainable energy supply. It provides options for biomass-based gasses, and an economy that is based on renewables. Natural gas is the cleanest of the fossil resources and very suitable to develop new technologies that can also be used after the transition has taken place.

9.4 The Grounds for Change Methodology

The methodology used in both design charrettes consists of three distinct steps (Fig. 9.4). The first step is dealing with 'Orientation', in which the participants are made familiar with the assignment, the context and the existing knowledge in the region. They are officially welcomed in an opening ceremony, in which decision-makers express their gratitude and the importance of the design charrette. Specific

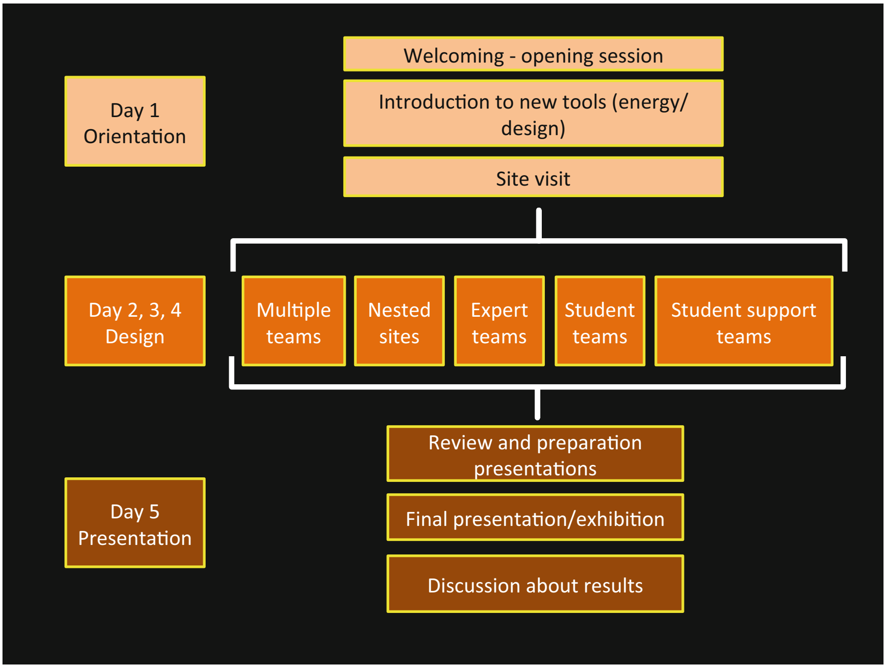


Fig. 9.4 The Grounds for Change methodology

information and exchange takes place on the different tools energy planners and spatial planners are familiar with and usually use in practice. Finally, a site visit is part of the orientation phase. In the second phase, 'Design', which lasts for three consecutive days, the design work takes place. Multiple teams, consisting of mixed experts, professionals and students, design sites at several spatial scales and interactively increase their own and general developed knowledge. They work towards innovative long-term solutions for a sustainable energy future. In the last step, 'Presentation', the designs are for the last time reviewed, and presentations are prepared. After the final presentation, in which each team presents its work, discussion takes place about the advantages of the work presented for achieving a sustainable energy future.

9.5 Program & Participants

The programs of both design charrettes, in Jinze and in Groningen are quite similar and follow the methodology as described in Sect. 9.4.

In the Groningen program (Fig. 9.5) an international team of experts received the assignment to design a sustainable energy system for the entire region. Part of their process was the session called 'Scanning the Future', in which the experts were

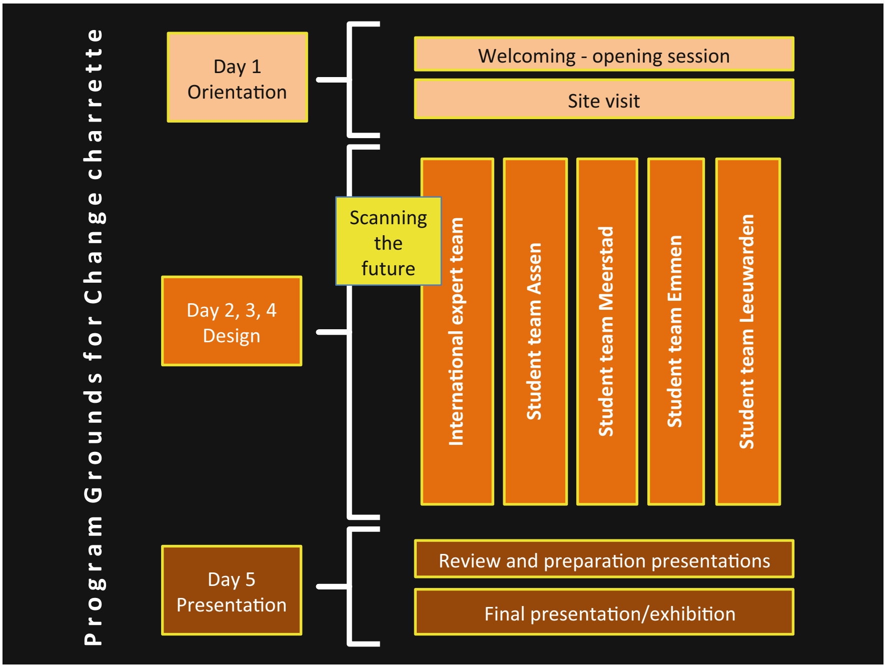


Fig. 9.5 Grounds for Change program

supported by external guest in identifying future opportunities and challenges in achieving a sustainable energy future. Besides this expert team, consisting of professionals in the fields of architectural, urban and landscape design, technology and energy, four student teams, Landscape Architects from Wageningen University, focused on a specific case study each. The student teams were completed with civil servants from the case study areas, and energy experts and designers from universities. All the teams were obliged to present their proposals at the closing session, at which several important decision-makers, such as board members from Gasunie and Energy Valley, directors form several provinces and aldermen from municipalities, attended.

The program during the Jinze charrette (Fig. 9.6), started with an entire day in which the official welcomes and the introductory speeches took most of the first day, which ended with a field trip by boat. The 3 days following were spend in three design teams, an international design team, speaking English, a Chinese expert team, who spoke Chinese and a Chinese student team, which consisted of students urban design Tongji University, also speaking Chinese. The teams presented their propositions on the morning of the fifth day, after which an extensive discussion, supported by a translator, about the design results and the required next steps to realise a sustainable energy future, took place. The last day ended with hospitality speeches, which officially concluded the design charrette.

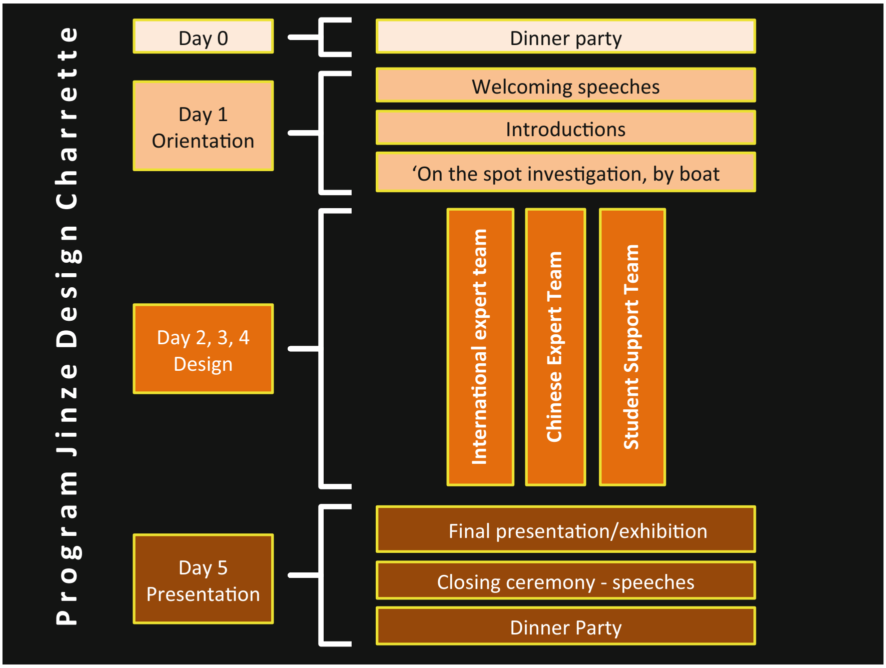


Fig. 9.6 Program of the Jinze design charrette

9.6 Results

The outcomes of the design charrettes show very different results for each of the regions. North Netherlands focuses specifically on sustainable energy landscapes, while in JInze the integration of water system, energy and tourism is explored. Both design propositions make use of three general strategies, which were developed in the Dutch design charrette.

9.6.1 Strategies

In the design charrettes several strategies have been developed to support the design of sustainable energy futures.

9.6.1.1 Multi-energy Strategy

When an energy supply system is dependent on just one or two fossil energy resources it becomes very vulnerable. On the one hand side, depletion of indigenous

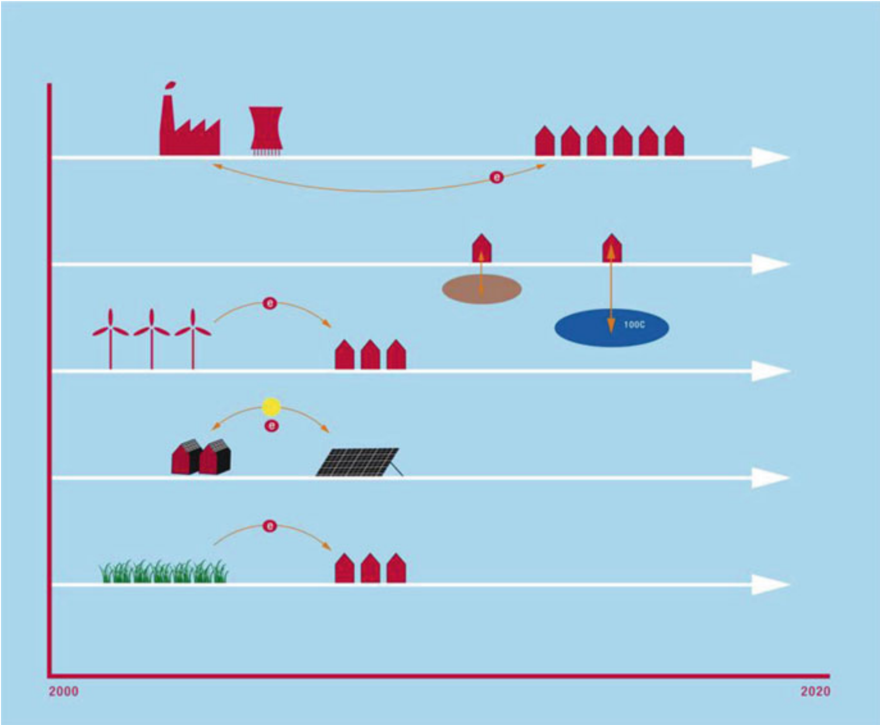


Fig. 9.7 The multi energy strategy (Roggema et al. 2006)

reserves makes the region extremely dependent on import, and on the other hand large investments are needed to adjust the single-source infrastructure to the new energy sources. For both reasons, a sensible energy strategy includes a broad pallet of energy sources (Fig. 9.7), such as wind, solar, geothermal, biomass and gas-fired power plants. The ultimate goal is to ban all resources except the renewable ones.

9.6.1.2 Low-Exergy

According the First Law of Thermodynamics *energy* can never be 'lost' during a process; it only changes from one form into another. Where the quantity therefore cannot change, the Second Law of Thermodynamics learns that the quality can. When a system has a high exergy, the entropy is low and vice versa. Different systems require and produce different qualities of energy. Where some systems produce high quality energy as rest product, other systems can use this same quality. In many socio-economic systems high quality energy, e.g. heat of high temperatures (1,200 °C), is used in systems that use lower qualities, such as space heating of houses, for which only a temperature of about 20 °C is required. Another example is the use of electricity (valued as a high-quality energy source, produced from primary energy sources at an efficiency of about 50 %) for producing hot water. Hence energy quality is lost. This offers opportunities to increase the efficiency of a system. When re-thinking the way energy qualities are used in systems such as households, buildings, cities and regions, linkages between higher quality producing functions and same or lower quality demanding functions can be profitable. A chain of continuously lower quality energy demanding functions can be imagined: a cascade of energy qualities. This principle, to lose as little energy quality between the different functions is called Low-Exergy (or: LowEx). In order to achieve this it is obvious that functions, or systems, that can help, or profit from each other need to be spatially connected (Fig. 9.8). Taking into account the quality of energy sources leads to the development of energy cascades, result in the development of energy cascades, from high quality energy (high temperature) to low temperature heat. This requires an adjusted spatial planning strategy.

9.6.1.3 Three Dimensions

Our present fossil energy resources are depleted from depths of several kilometres. This can be classified as a one-dimensional orientation in the energy supply. With the exploration of renewable resources, which are seen as mainly harvested at the earth's surface or in the first 100 m in the air, the sustainable variant of energy supply is also one-dimensional. The 3D-strategy is oriented on the exploitation of all three layers: (deeper) soil, surface and the (higher) air. It is increasingly recognized that the (deep) underground offers promising options for our future energy system. The ground has the capacity to store thermal energy over long periods for seasonal purposes. In addition, the techniques required are not very complicated and do not require fancy technologies. One example of underground thermal energy storage is storage in aquifers (large natural groundwater basins). Furthermore, the deep underground can also be used for the storage of CO_2. Also, the higher air is an interesting and undisclosed territory. Here, innovative energy harvesting can be developed. One of the first innovations to explore higher altitudes is the 10 km high kite, the 'ladder mill' (Ockels 2001). It is time to include all three dimensions in spatial plans and make them part of future design strategies.

9.6.2 North Netherlands

The design charrette in North Netherlands explored the Exergy concept and discussed the spatial challenges and opportunities. The Low-exergy principle matches supply and demand of energy qualities in order to lose as little exergy as possible. This can be achieved to locate the functions that need match close to each other, as a cascade in the landscape: high-caloric waste heat is supplied to the next energy demander in the chain, who in turn supplies waste heat to the next, lower-grade

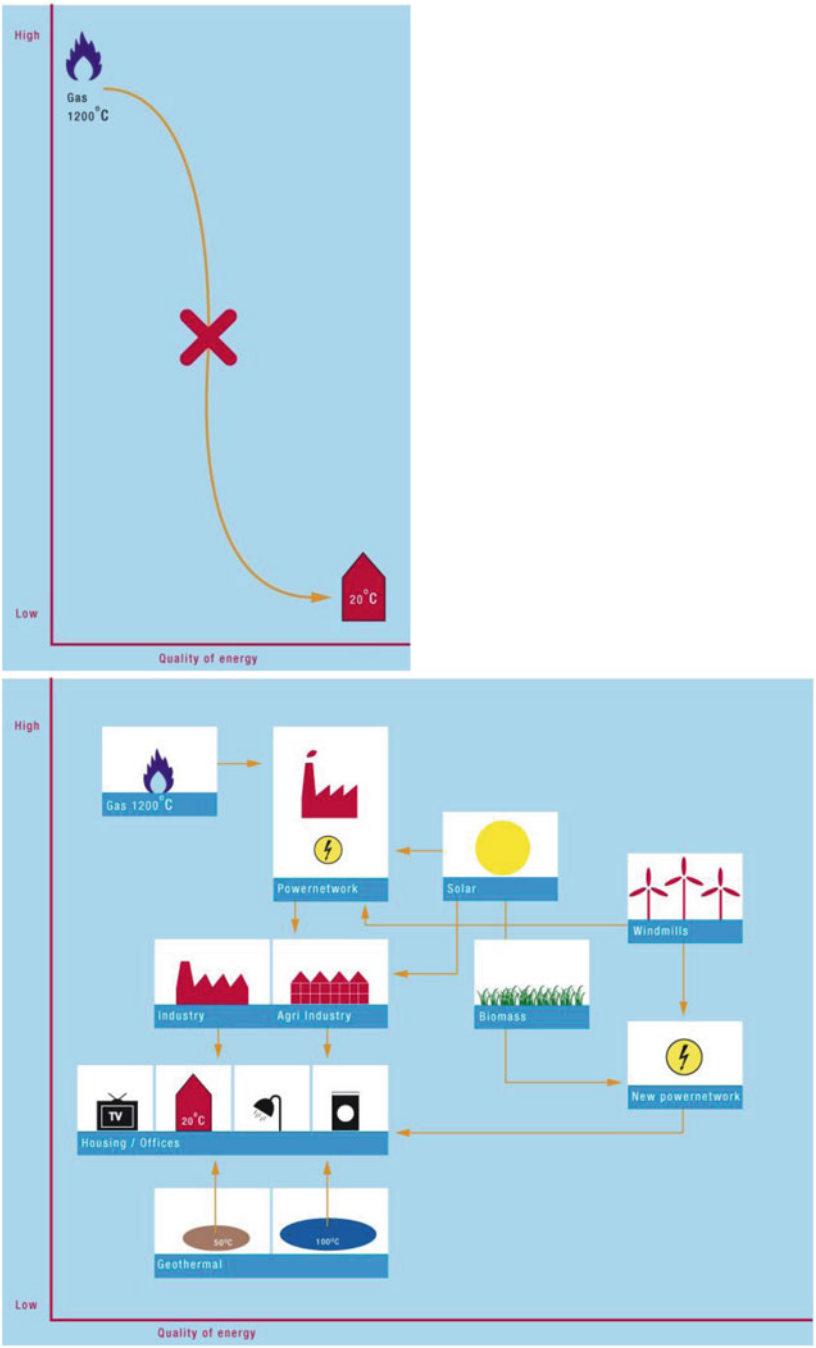


Fig. 9.8 The low-exergy strategy (Roggema et al. 2006)

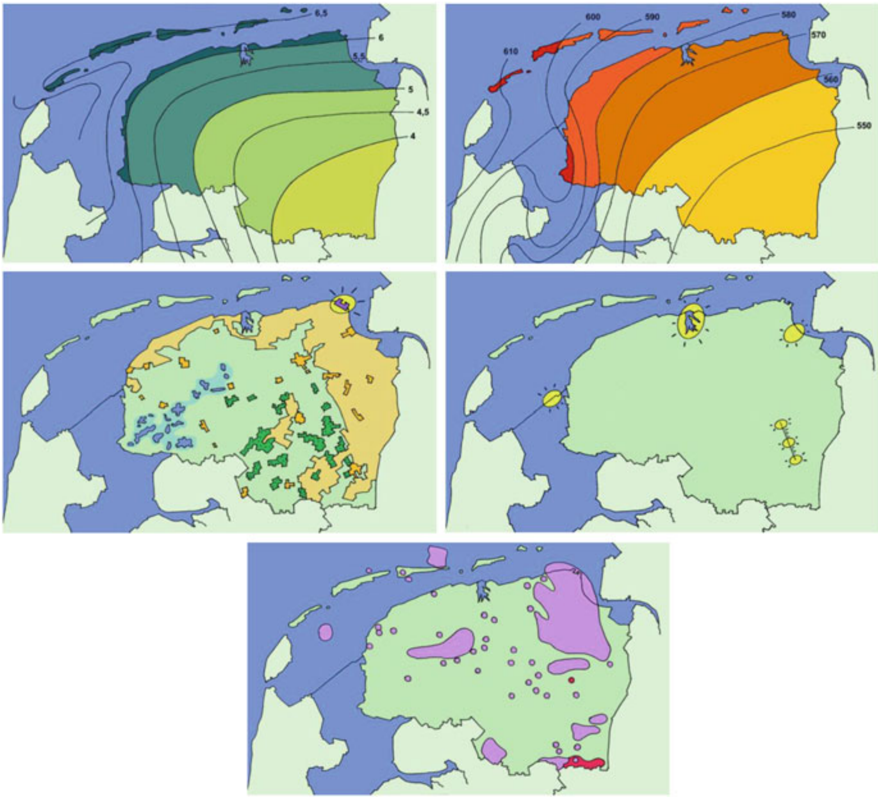


Fig. 9.9 Energy potential maps for wind, solar, biomass, hydropower and geothermal (Roggema et al. 2006)

function. In order to find out where the chain starts and ends the geographical availability of energy resources determines the best places for high intensive energy functions, namely where high intense energy can be harvested. Therefore, an analysis was conducted for the Northern Netherlands in which parts of the landscape which types of energy could be yielded. The ‘energy potential maps’ were the result of this analysis on which the suitability of wind energy, the potential extraction of geothermal heat, the possibilities for the produce of crops for biomass, the suitability to yield solar energy and the potential for hydro-power were projected (Fig. 9.9).

When these analytical maps are combined an image of the different energy qualities, geographically dispersed, could be drawn up: the energy-mix map (Fig. 9.10). This map shows the energy ‘richness’ for each of the different subregions and landscapes.

In four design steps (Fig. 9.11), the knowledge about cascading different functions and the energy potentials was used to design specific typologies in the landscape of North Netherlands. The first step is to define energy potentials in a spatial way. In which areas can what types of renewable sources be harvested? The map

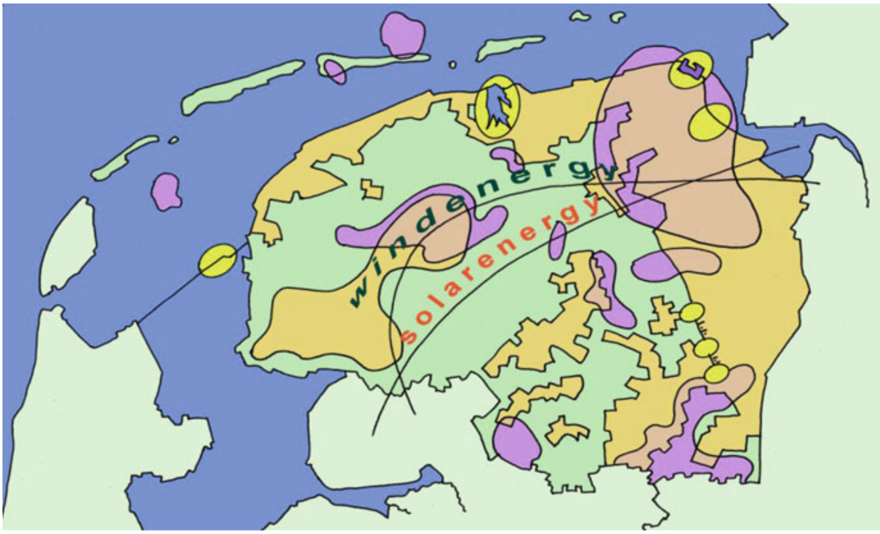


Fig. 9.10 The energy-mix map, indicating the greatest potentials of locally available energy (Roggema et al. 2006)

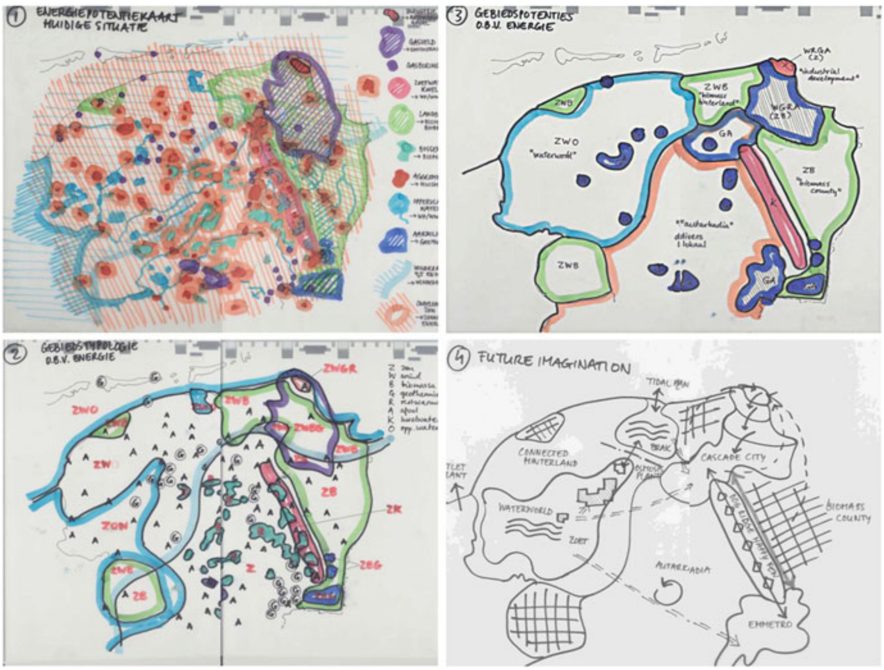


Fig. 9.11 In four steps from energy potentials, via energy typology and area potentials to an imagination of energy landscapes (Drawings: Andy van den Dobbelsteen, Grounds for Change design charrette, Groningen 2005)

Fig. 9.12 North Netherlands energy landscapes (Roggema et al. 2006. Drawing: Province of Groningen)

accompanying this step is one on which all the current energy potentials are collected. The second step is to combine these energy potentials into area typologies. Specific typologies are defined for areas with a specific combination of potential energy sources. The third step defines area typologies. Based on a specific energy potential combination, what kind of areas emerges? For instance, if there are not many renewable sources available, the area typology is labelled ‘Autarkadia’ and if there is an abundance of biomass it is dubbed ‘Biomass County’. For each of the areas a specific typology has been created. The final step is the imagination of the typologies in a structural landscape design. These energy landscapes (Roggema et al. 2006) give direction to the location of spatial functions. These can be functions to harvest energy from renewable sources (biomass crops, solar farm, etc.) or function that require a specific quality of energy (greenhouses, residential, offices, etc.). Matching supply and demand, i.e. relation of functions localized towards each other, in combination with the potential renewable energy available, the energy ‘richness’, the most appropriate functions for each area could be defined. By connecting these functions in such a way that cascades of energy evolve – in which one function uses the waste energy of the other – a very energy-effective and sustainable energy system can be designed. For example, where high intensity energy is present, close to the existing power plants a ‘Cascade City’ is projected, which consists of spatial zones around the primary source, each zone containing functions, which subsequently demand lower qualities and use rest heat. Derived from these analyses, different areas originate, each with its own characteristics, both spatial and energetic: the energy landscapes (Fig. 9.12).

The energy landscapes of North Netherlands are based on energy typologies in sub-areas, each with a specific spatial characteristic and accompanying sustainable energy opportunities (Roggema et al. 2006):

1. **Windy Dikes and Reefs**. The barrier islands to the north and present sea dikes are very suitable for wind energy. The wind is abundant and strong. Existing techniques such as wind turbines provide the 'Connected Hinterland' with the electricity needed there. Also, innovative techniques, such as the 'laddermill' (Ockels 2001), can be located in this area;
2. **Connected Hinterland**. The majority of the energy required in the northern parts of Groningen and Frysia can be provided by wind energy. The heat demand in larger urban areas such as Sneek, Leeuwarden, Dokkum and Leek but also the existing knoll villages (the so-called *terpen* and *wierden*), can be provided by geothermal resources, for which drillings to deeper layers of the earth must be established. For cases of possible shortage (for instances in cases of low winds) a backup connected with the 'Industrial Development' area is foreseen;
3. **Water World**. The intervention to stop pumping large parts of Frysia dry, and save a serious amount of energy, the water level in these areas will increase. The availability of both fresh and salt water opens the opportunity to harvest electricity through an osmosis plant. A tidal plant is projected near Lauwersoog, where historic tidal systems are rehabilitated. These power plants mainly supply electricity to the power grid. Should remain demand for electricity this will be provided through active solar energy, wind energy (small turbines) and heat pumps. People live in low densities near, next to, on or in the water;
4. **Autarkadia**. The higher plateau of Drenthe (and a part of Frysia) remains relatively empty. It is the area where rainwater infiltrates into the soil to keep the ground water at level. People living in this area provide themselves with electricity using (small-scale) solar and wind technologies. The most significant energy resources are biomass, heat and cold from the underground by heat pumps, and geothermal heat. People from this area do not use collective facilities but stock up themselves with food, energy and water. Public artificial lighting is rare in this area. For the necessary extras the autarkadian dwellers can move over unpaved and non-maintained roads with their Sustainable 4WD to the closest supermarket;
5. **Biomass County**. Eastern Groningen changes into a biomass producing landscape. Large-scale, modernly produced biomass is transported efficiently to a biomass plant in the area of 'Industrial Development' (Eems Harbour-Delfzijl).
6. **Industrial Development**. In the zone between Eemshaven and Delfzijl large industrial developments are proposed, because in this area high quality energy is produced. Which is used in high-grade functions. The biomass plant, which not only converts industrial biomass into electricity yet also waste from the entire northern region, supplies power to the industry and to the 'Urban Corridor';
7. **Urban Corridor**. All urban cores from Meppel to Groningen are connected through high-quality urban transport over the motorway. Together they form the Urban Corridor, an urban network that connects the northern region to the rest of

the Netherlands. The urban environments are dynamic, with everything at hand a modern lifestyle demands for. The electricity in this Corridor is supplied through the biomass-driven power plant located in the 'Industrial Development'. For heat the area is connected to a series of geothermal drillings, which extract hot water from the deep underground for heating and hot water;

8. **Dog Ridge Estate**. The Dog Ridge (Hondsrug in Dutch), from Groningen to Emmen, is suitable to develop new estates, which use heat pumps to provide energy;
9. **The Green Community**. The southernmost point of the Hondsrug end in the Town of Emmen, which transforms into a Green Community, where ecological lifestyles flourish. Energy is supplied by biomass for electricity and geothermal heat.

The LowEx principles were used to design a series of cascades the Eems delta area. This is the area where the highest-grade energy is produced and used. Urban domestic waste is transported to Cascade City, where it is incinerated and directly used in industry and horticulture. In the form of electricity and heat it subsequently returns to the Urban Corridor, where it is used in housing, offices and hotel and catering industry.

9.6.3 Jinze

The underlying landscape of Jinze town is structured by the water and land configuration (Fig. 9.13). If we took out all buildings and infrastructure an archipelago of islands would appear. This strong principle has been and will be of great influence on the possibilities of projecting functions and the sustainability of the system. Locating functions against these natural forces requires much more effort (in energy use, maintenance and water purification) than when planning is done in synergy with the flow of the natural 'water and islands' system.

In the current situation there is a misbalance in the area, because of the intensive road networks (Fig. 9.14) and urban systems, such as buildings and fishponds (Fig. 9.15) 'occupying' the underlying landscape.

The allocation of the road-network, building structure and fishponds shows us that step-by-step a less sustainable situation has been created. More intensive functions have suppressed the structure of islands and open water. The transformation of open water into fishponds and other 'urban' functions led to a misbalance, which is only exaggerated by new roads crossing the water, and in turn attract new urban functions. The growth of urban functions neglecting the natural system is a threat to the sustainability of the area.

A sustainable way of growing respects the natural forces and developments take place according the rules of the natural system. Economic developments are possible within these boundaries: a sustainable economy of working in and with nature! The integrated proposal, developed during the design charrette, develops Jinze

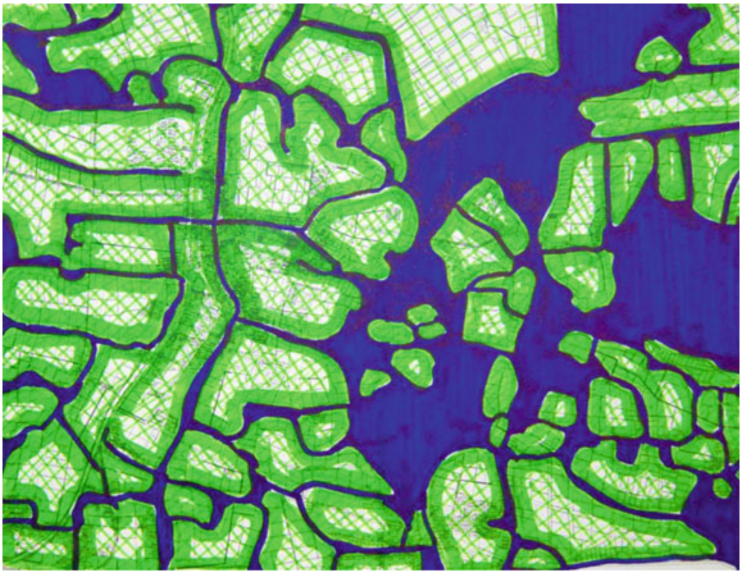


Fig. 9.13 Jinze: an archipelago of islands (Roggema and Van den Dobbelsteen 2006)

Fig. 9.14 Road-network occupying the underlying archipelago (Roggema and Van den Dobbelsteen 2006)

Fig. 9.15 Buildings and fishponds occupying the landscape of islands and water (Roggema and Van den Dobbelsteen 2006)

Town as the regeneration area. Here water is reused and purified, the town offers abundant space for ecological development, it takes care of its own energy demand by generating local sustainable energy, and it regenerates people's minds as they enjoy themselves in the view-gardens, during the boat rides, hiking and biking tours, and overlooking the water from their eco-resorts. In order to reach a regenerating region, three aspects need to be ecologically and sustainably designed: water, energy and tourism. A sustainable water system retains much more water within the area, cleansed and treated in a natural way and circulated. The energy system functions with a zero carbon emissions and will be independent of fossil fuels. When local energy potentials are used the area can be supplied with sufficient electricity and heat. Finally, the area has excellent opportunities for ecological and cultural tourism and active recreation, which can be developed to become attractive for the Shanghai agglomeration.

The current water and energy system is unsustainable (Fig. 9.16). The current water system is polluted in different places and at the end of the chain all the polluted water is treated in a wastewater treatment plant. At present water is not circulated nor re-used. The current energy system depends mainly on fossil fuels, delivered to the households by a power plant or by gas flasks (butane and propane). Solar or wind energy are currently not used in practice.

In a future sustainable system (Fig. 9.17), water and energy flows are better integrated and make use of each other. Water is cleaned, circulated and re-used

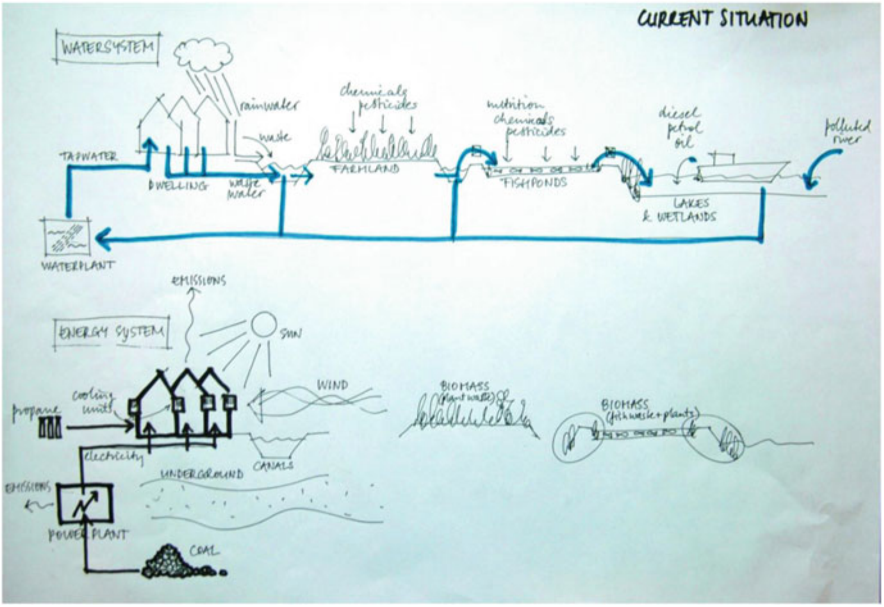


Fig. 9.16 The current water and energy system (Roggema and Van den Dobbelsteen 2006)

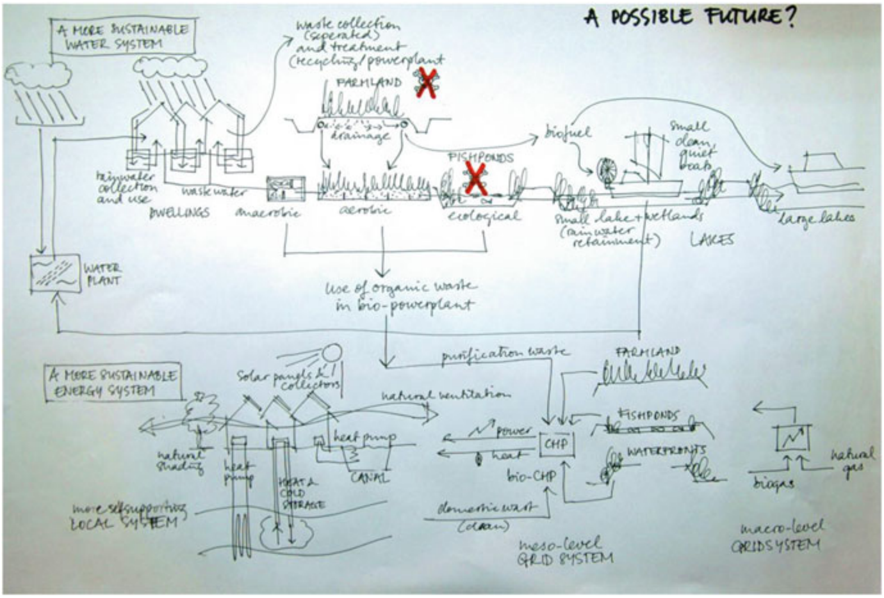


Fig. 9.17 A sustainable future energy and water system (Roggema and Van den Dobbelsteen 2006)

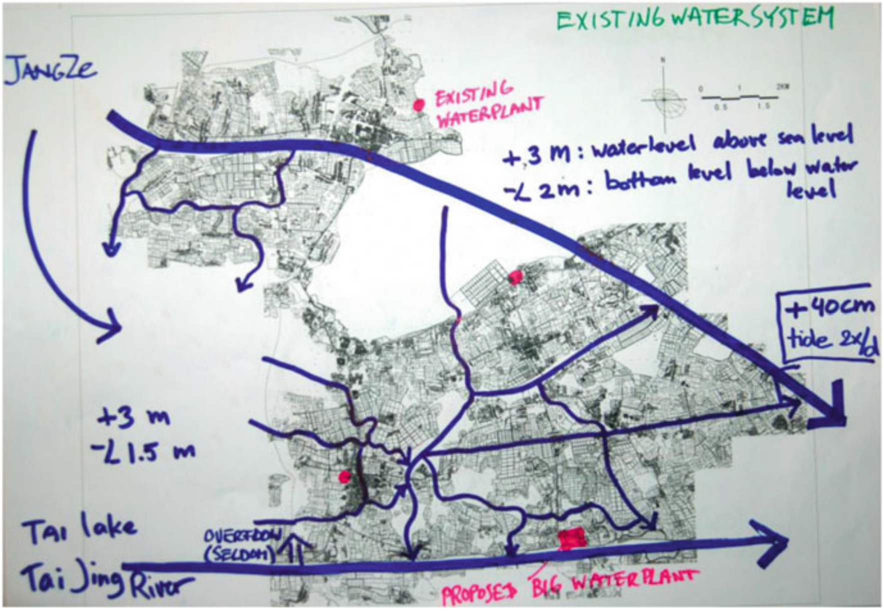


Fig. 9.18 Polluted water streaming through Jinze Town from the Jang Ze river to the Tai Jing river (Roggema and Van den Dobbelsteen 2006)

in the area and the residues of wetlands and other waste of agriculture are deployed as fuel for biomass plants, which provide the demanded heat and electricity at the neighbourhood level. Moreover, solar and wind energy are also integrated in the system, but these sources are used in times of shortages and supply or extract energy form storage plants, which are proposed at neighbourhood level.

9.6.3.1 A Clean Water System

The current water system in the area functions as a throughput of polluted water. The run-off water is only marginally cleaned by wetlands, while pesticides and waste pollute the water extra at the same time. The polluted water originates from in the Jang Ze river (Fig. 9.18). This water is led through the area until it reaches the Tia Jing River, which is the cleanest water found in the area. While in the area the water fills fishponds (which are cleaned once a year) and irrigates farmland during the rice-growing season. Both farming and fish production add pesticides and chemical treatment to soil and water and ends up in open water. This pollution needs to be cleaned through the wetlands. To put it short, polluted water flows through the area without becoming much cleaner, before it enters a cleaner river of which the net quality is decreased.

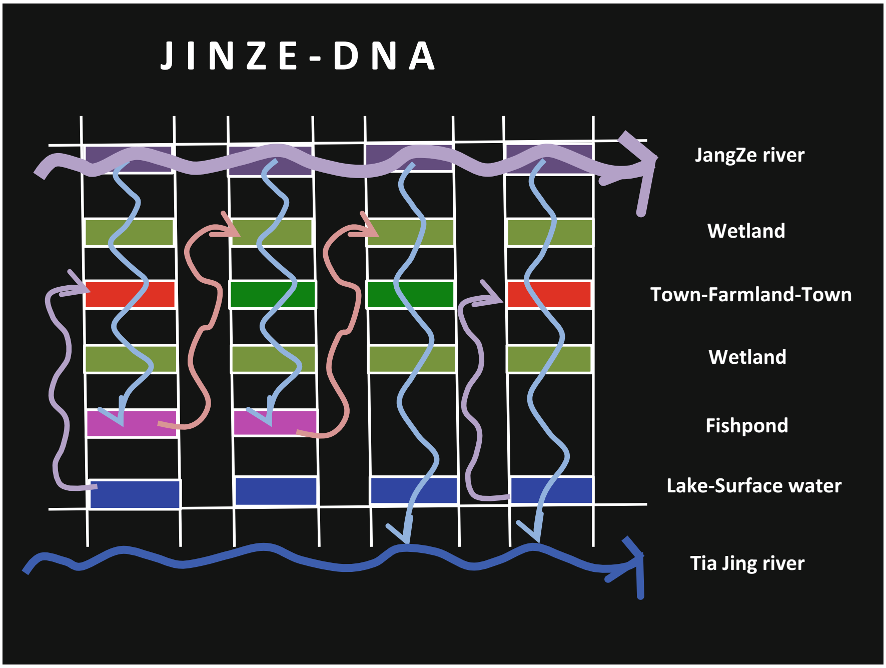


Fig. 9.19 The Jinze DNA

9.6.3.2 The Jinze DNA

The aim is to use and purify water inside the area. Quintessential is to stop the use of pesticides and to dump waste alongside banks and into the water. In order to clean the water within the area the Jinze-DNA is developed (Fig. 9.19). This system arranges water to be used for economic functions, but recycled within the area though redirecting water after use in towns, farmlands and fishpond into wetlands, before it flows into lakes and surface water, after which it can be discharged into the Tia Jing river. The water always needs to obey the order of increased 'cleanliness', e.g. after a process of 'usage-cleaning-reuse-cleaning' it needs to get cleaned to at least the quality of the river it flows in after leaving the area. The patterns of urban, rural and environmental spatial functions must be designed respecting this sequence.

The next step in the design is to project this DNA model to the area. A functional zoning scheme emerges in which the sequence of usage, cleaning re-use and cleaning is respected (Fig. 9.20). Each function is related to the next in the chain. The water from the Jang Ze river needs to be treated before usage in farmland, the town or fishponds. After being used here the water must be purified in wetlands, before it can be re-used. After it is used for a second time, the water is treated again, before it flows into the lakes or surface water. Water is buffered in this system and can be re-used when the demand requires it. At times of excess water in the buffers, clean water overflows into the Tai Jing River. In the design for the future water system of

Fig. 9.20 Functional zoning according the cleaning sequence and design proposition based on the Jinze DNA (Roggema and Van den Dobbelsteen 2006)

Jinze Town, the ‘clean-machine’ is leading the situation of functions. Centrally located in the design is the internal lake, which is a clean water buffer. This lake supplies water to several functions, which are zoned according the Jinze DNA: wetland, agriculture/town, wetland, fishpond, wetland and surface water. To minimise impact of traffic on the water quality, all transport through the town is disconnected and diverted around the area.

9.6.3.3 A Wise Use of Energy

It is estimated that natural gas and coal reserves will be depleted by 2040. Therefore, investing in a new gas network is not very smart and unsustainable. Instead, harvesting energy from local renewable sources, such as biomass plants, solar and wind-energy is preferred. The urban and regional design builds on harvesting thee potentials and uses the principles of Low Exergy and bioclimatic design. For example, ventilation and passive cooling of buildings profit from the wind, blowing over the lake, predominantly from the North-East, under the condition that the designs of buildings are adjusted to embracing this relatively cool flow. This bioclimatic principle also applies to other conditions, such as the sun angle and orbit in the sky, storage potential in the underground or the deployment of plants in the climate design of towns and buildings. The Low-Ex principle implies the use of high-quality energy and high-caloric heat for high-grade functions (e.g. industry) and re-using waste heat for other functions (e.g. heating of houses).

9.6.3.4 Jinze Town Structure

The design proposition for Jinze Town (Fig. 9.21) respects the original island structures. Moreover, these form the basis for the future spatial layout. New building sites are situated according the archipelago. The majority of the fishponds are

Fig. 9.21 Integrated design proposition for Jinze Town (Roggema and Van den Dobbelsteen 2006)

transformed into wetlands or ecological reserves. Direct thoroughfares by car through the town are made impossible, though it is easy to reach the area by bus. Local transport uses the waterways and lakes. All other travel through the area takes place on foot or by bike. The infrastructure leads to two village-types: an isolated and a connected type. The isolated village is self-supporting and provides itself with energy and food and cleans and re-uses its water. The connected village is strongly connected to the infrastructural grid. Via this grid transport and energy connections are possible. Used water is cleaned in wetlands before it is discharged to lakes and surface water.

Local transport mainly uses waterways and the lakes, which requires an intensive network of water traffic. Therefore, local manufacturing of environmentally sound boats, which are quiet and clean, is proposed. The shipyard for sustainable boats is located at the south end of town (Fig. 9.22) and this new industry increases the number of jobs. The boats find their place in the new developed marina. The demand, globally, for clean and quiet boats (responding to climate change and rising water levels) will rise rapidly, which results in a successful the Jinze 'Susbo' Yard in terms of manufacturing for and exporting to foreign countries.

Centrally located in the lake area a 'floating college' (Fig. 9.23) is proposed, a distinguished research institute for aquatic ecology, which focuses on studies related to ecology, water quality, natural purifying capacity and wildlife. Connected to the college is the accommodation for students, researchers and (visiting) professors. A training centre for recreation and tourism will also be part of it. One of the islands in the Jinze area is reserved for an eco-village resort,

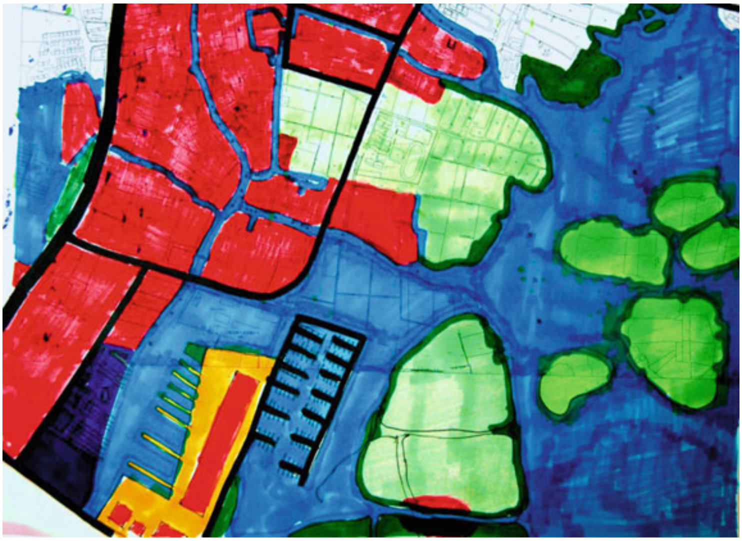


Fig. 9.22 The new Jinze harbour and shipyards (Roggema and Van den Dobbelsteen 2006)

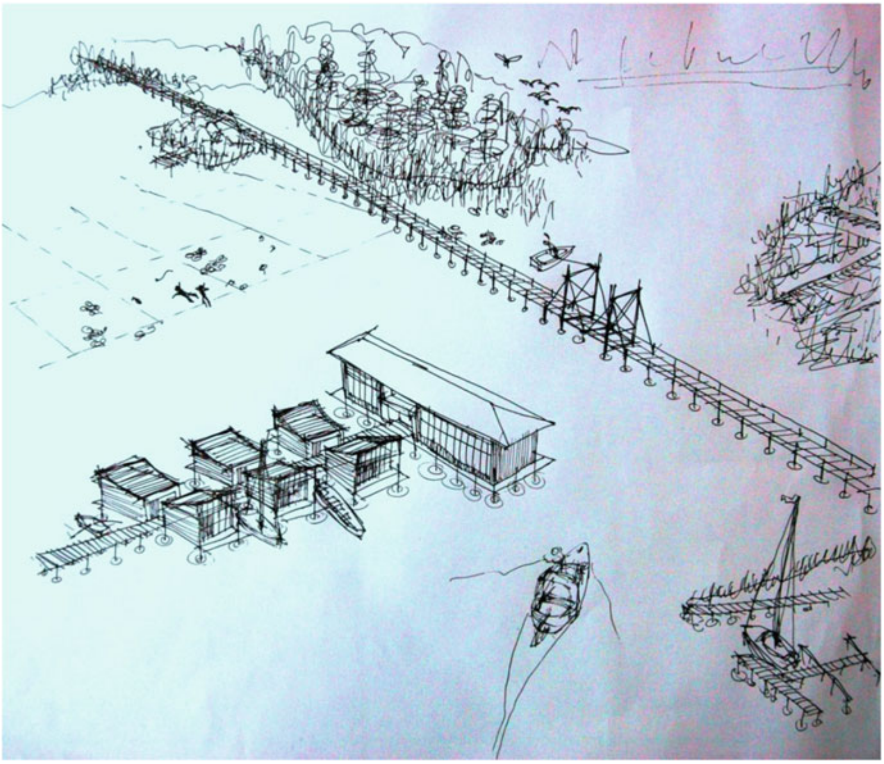


Fig. 9.23 Bird's view of the research institute and student accommodation in the middle of the lake (Roggema and Van den Dobbelsteen 2006; Drawing: Andy van den Dobbelsteen, Jinze Design charrette 2006)

Fig. 9.24 Ecological soft edge and ferry landing edge and Boardwalk through wetland edge (Roggema and Van den Dobbelsteen 2006; Drawings: David Rousseau, Jinze Design Charrette 2006)

where people can stay and recreate in a sustainable way. The eco-village is a demonstration project for the whole of China. The houses and a hotel will be built in accordance with highest standards in sustainable principles and technology. Facilities are managed ecologically and become an example project for green hotels.

On a more detailed level, the treatment of the edges between land and water is very important for the cleaning of water and recreational possibilities. The existing quality is low. The ecological value is minimal and the possibilities to make use of the edges for recreational purposes are limited. For different types of edges (Fig. 9.24) an ecologically better solution is designed and existing edges are transformed into better usable ones.

Fig. 9.25 Birds viewpoint (Montage: Gunter Wehmeyer)

Fig. 9.26 Walking the boardwalk alongside the big lake (Montage: Gunter Wehmeyer)

These edges can be experienced through the construction of a loop of boardwalks and routes through Jinze Town and its surroundings. A network of paths makes it possible to connect different tourist highlights of the area. An historical route connects traditional gardens and agriculture, temples, ancient bridges and historic houses, while the ecological route provides a connection between the eco-village and eco-resort, the floating college and floating houses and the wildlife sanctuary and ecological reserves. Elevated boardwalks connect the different places with each other, but form also an attraction by itself (Figs. 9.25 and 9.26).

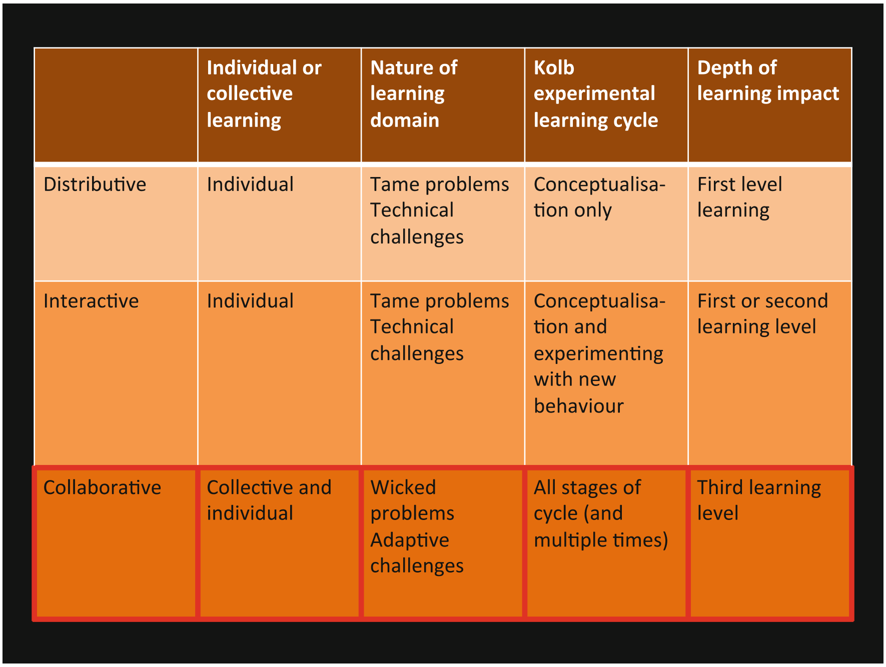
To be able to refresh your energy, breath clean air and enjoy the waterside in this ecologically unsurpassed area is a real gem. Smaller urban developments, which are connected through the routes and boardwalks with the historic buildings and the great opportunities for active recreation and ecological and cultural tourism, make this area a tranquil oasis where a sustainable future can be really experienced: a blue heart in a red belt!

9.7 Success Factors

The two design charrettes in Groningen and Jinze were eye-marked with a specific objective: to design a region for a sustainable energy future. In several ways these design charrettes were a success:

1. They integrate energy supply design and physical spatial planning. These charrettes combined urban system design, e.g. the energy system and others, with spatial planning and physical design. Expertise was equally divided between design experts (planners, (landscape) architects) and energy experts (engineers, utilities). The long-term perspective allows these groups to explore how an (urban) region might function and look like, adjusted as it is to becoming a sustainable energy system;
2. They involved multiple teams and several spatial scales. The charrettes involved multiple teams, each focused on a unique site and different scales. The physical scales were 'nested', so that one team focuses on the urban region while others on specific towns (Jinze) or development locations, such as in Emmen, Assen, Meesratd and Leewarden. The variety of teams explored different dimensions of the assignment and they were, at the same time, all concerned with the same thematic problems. This made it possible to interact throughout the charrettes, which led to synergy between the diversity design solutions.
3. Local and worldwide experts participated. The variety of participants provides for different views and expertise to be brought in the design charrettes. Teams consisted of academics and students in the field of energy technology, energy planning, urban design and landscape architecture, local government experts and design professionals, technical experts from utility companies, international design professionals and energy experts from international energy institutes.
4. It lasts for an entire week of intensive design sessions. The charrettes brought participants together for a full week, which proved to be a good way to build relationships (which takes time) and allowed for innovative ideas to emerge.
5. Designs were produced for the long-term future, ranging from 5 to 30 years. In the charrettes the participants were challenged to design for the longer term. The transformation in thinking from a short-term oriented mind-set towards the progressive and flexible futures that were demanded in the charrette proved to be challenging but very rewarding. The design results showed a staged implementation of short-term measures that evolve over time. They included the features intended to allow the city to adapt easily to upcoming technologies and fuels, to recover from the inevitable shocks, and to adapt to new opportunities.

Within the design charrette collective designing and experiencing took place and broad exchange between different cultural and professional backgrounds took place. The subject of a new sustainable energy system requires a system change, which in itself is not a simple, but a complex, rather wicked, problem. There was room enough for contemplation and experimenting, whilst reflecting on the relation between a technological oriented sector and the artistic one, resulting in new concepts and ideas. The assignment itself, to design a new energy system for the



	Individual or collective learning	Nature of learning domain	Kolb experimental learning cycle	Depth of learning impact
Distributive	Individual	Tame problems Technical challenges	Conceptualisa-tion only	First level learning
Interactive	Individual	Tame problems Technical challenges	Conceptualisa-tion and experimenting with new behaviour	First or second learning level
Collaborative	Collective and individual	Wicked problems Adaptive challenges	All stages of cycle (and multiple times)	Third learning level

Fig. 9.27 Learning in the Grounds for Change charrettes

longer future, asked for breakthrough thinking. This collaborative learning had deep impact (Fig. 9.27).

9.8 Place in Charrette Wheel

The two design charrettes took place in The Netherlands and China respectively and they were focused on the regional questions relating to the design of a sustainable energy future. In different subgroups the regional focus was swapped for a more concrete neighbourhood or town level at which other solutions and ideas floated. The landscapes both in China as well as in the Netherlands are predominantly rural, in which some peri-urban developments and well-contained villages and towns appear. The issue of changing the current energy unsustainable system into a system based on using renewable sources is a complex matter, for which not single-minded and easy solutions are abundantly available. Especially the focus on the long-term urges a flexible approach allowing change to occur over time. The design charrettes, despite the pre-selection of participants, were attended by a broad group of experts from the different academic fields, such as design, planning and energy technology, but showed also a good mix with local experts, government participants and students (Fig. 9.28).

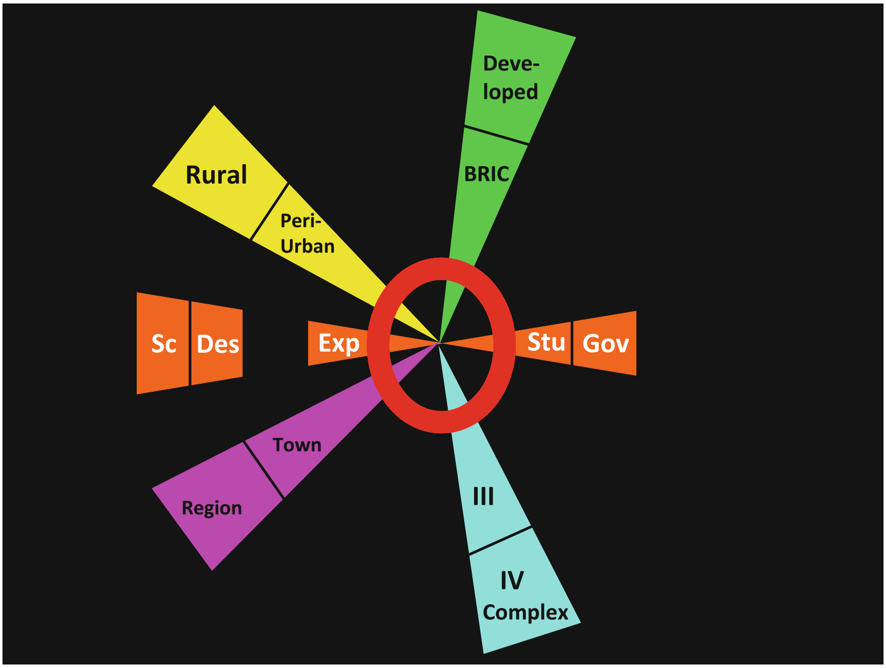


Fig. 9.28 The Grounds for Change charrette wheel

9.9 Conclusion

The design charrettes with the eye-mark to design innovative futures for a sustainable energy system delivered designs that, perhaps due to the assignment itself, were far from current policies. The design charrette format contributed to discussing, exchanging and designing these kinds of solutions. The format, being challenging in time constraint and in the scope of thinking, provided the environment to come up with the most innovative designs. The design charrettes proved to be able to bring together the diverted fields of energy technology and spatial design. The two cases, being organised in a very different background, illustrated that, no matter the context, these innovative concepts and design can be derived in each situation. The fact that these design charrettes were executed within an international context, combined many different points of view and experiences and involved a broad spectrum of professionals has two effects. The first effect is that exchange of different backgrounds leads to new insights, purely because different 'packages' of knowledge are brought together. The second effect is that local participants cannot withdraw from the design process and hide in their own old-fashioned policies. They would feel condemned and therefore rather adjust to new standards than stick with their original opinions. This external pressure is forcing all participants to contribute their most innovative ideas to the design process.

A special role is reserved for the students, involved in the design teams. They are not bound by vested interests and are in the position to launch fresh and unconventional ideas and concepts. They bring in the most up-to-date knowledge and can always ask the impropriate questions.

Finally, it is questionable, despite the innovative results whether these processes really influenced decision-making and policies in the two regions. In the Dutch case there has been follow-up in the form of energy programming and regional planning, but to what extent the original ideas from the design charrettes play a firm role is doubtful.

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Chapter 10
Design Charrettes for Sustainable Building in China

Rob Roggema and Bing Yu

10.1 Introduction

In recent decennia, Chinese building efforts are incomparable. The pace of urban developments has been fast and serious amounts of new buildings have been built around the country. Due to the rapid developing processes, and this is not limited to Chinese practice, the sense of quality can be questioned. For the Chinese Ministry of Construction and Dutch Ministry of Housing it gave reason to adopt a Memory of Understanding about collaborating and exchanging knowledge in the field of Sustainable Building. Within the cooperation several demonstration projects in different cities in China, not only being the usual suspects Beijing and Shanghai, but also in Chongqing, Guiyang and Shenzhen. In order to increase the sustainability in some of the largest building developments in these cities, the Sino-Dutch collaboration provided the opportunity for Chinese developers to organise weeklong design charrettes in which Dutch and Chinese expert teams participated to support, advice and design sustainable options for the respective sites.

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10.2 Three Chinese Building Sites

In this Chap. 3 of the demonstration projects are discussed: the Longhu project in Chongqing, the Vanke Stream Valley project in Shenzhen and the Yu'an and Anjing project in Guiyang.

10.2.1 The Longhu Project, Chongqing

The Longhu project is located in the peri-urban area of Chongqing. The case study area is part of a widespread development zone, where residential areas are combined with amenities, infrastructure and recreation (Yu et al. 2006). The landscape patterns consist of a diffuse network of hills, slopes, flat areas and curving routes (Fig. 10.1). Elevation varies remarkably across the site and there is a large diversity in the steepness of the slopes varies largely. The water system in the area is highly differentiated and dense. Water flows down the hills and is captured and slowed down in many steps by opening or closing little dikes or stones to keep or transport water from one field to the next. This system allows for the water to be re-used over and over again for many different purposes, such as the production of crops, washing clothes or cleaning the house. Chongqing is located in the transition area between the Qinghai-Tibet Plateau and the Middle-lower Yangtze Plain. It is part of

Fig. 10.1 The landscape in the Longhu demonstration project, Chongqing

the humid sub-tropical monsoon climate belt. The annual average temperature is 18–20 °C with a low temperature of 4 °C in winter and a high temperature of 40 °C in summer. Chongqing is also a fog city that has about 100 foggy days a year usually in spring and summer. Chongqing receives abundant rainfall, averaging about 1,000–1,400 mm annually. It has plenty of evening rain all year round, but most of it falls in summer.

10.2.2 Yu'an and Anjing District, Guiyang

The Yu'an and Anjing district, near Guiyang City Centre, is sparsely inhabited. People living in the area – mostly farmers – are poor and live in bad conditions. There is hardly any sanitation and chemical factories and a polluted river dominate the landscape. Although the density of houses is relatively low, the entire landscape is in use for agriculture or living. It is nearly impossible to find a natural undisturbed landscape. The landscape is a hilly area with very steep slopes, cut through by the scenic, but polluted Nanming river. The views in the area change constantly. This 'scene-after-scene' sequence makes the landscape very rewarding. Because of the differences in slopes, hilltops and flat areas biodiversity is in potential high, but in practice very low. This is caused by a widespread pattern of many different buildings, small factories and small-scale agriculture (Atkins 2007). The intensive use of the landscape causes not only a low biodiversity it also decreases the visual quality of the landscape (Yu et al. 2008a). The climate in Guiyang belongs to the subtropical monsoon climate. It is temperate and humid without strong winters or hot summers, abundant rainfall and long frost-free periods, which last about 270 days. The annual average temperature is 15.3 °C. The hottest days in July are a moderate 24 °C on average and the coldest days in January 4.6 °C. The rainfall is 1,197 mm of which around 75 % falls between June and October. The relative humidity is high: 76.9 %. Droughts or waterlogging often occurs because of the rainfall unbalance among the seasons (Fig. 10.2).

10.2.3 Vanke's Stream Valley, Shenzhen

Stream Valley is located in the surroundings of Shenzhen in Southern China, not far from Hong Kong. The ecological values in the area are significant. These values developed during the period without human activities consisting of farming, before 1998, and, after 2004, when building rights permitted on the preparation phase of the building process. Water is an important element in the area, which caters for the ecological values and has therefore strict qualitative and quantitative requirements. Building in the area is subject of stringent regulations. Impact on

Fig. 10.2 The landscape in the Guiyang demonstration project

biodiversity should be minimized, both during and after the building activities and if a road needs to be built eco-crossings are demanded to ensure ecological richness (Yu et al. 2008b). Part of a subtropical marine climate, Shenzhen has plentiful sunshine and rainfall all year round. The average temperature is 22.4 °C. The area is subject to occasional typhoons, normally occurring between May and December, the heaviest between July and September. Annual rainfall is 1,900 mm, of which 75 % falls between May and September. Seasonal differences determine the growing circumstances in Stream Valley, which are abundant in summer with high rainwater runoff and steamy air, while a shortage of water characterises the winter period.

10.3 Objective and Assignment

The objectives of the design charrettes for the sustainable building demonstration projects in general are to improve the sustainability of each of the design proposals. More specific, the requirements to fulfil this objective need to be defined according green building standards derived from Dutch sustainable building experiences and the Chinese Guideline of Green Building Design. This implies an integrated evaluation of the preliminary design proposal and proposal of strategies and measures to improve the sustainability. In greater detail the objectives are to:

1. Analyse and recognise ecological impacts of the proposed building activities in the entire lifecycle;
2. Propose an ecological evaluation system, and analyse the proposed design accordingly;
3. Develop specific solution strategies to mitigate ecological impacts;
4. Propose an ecological design for the site, consisting of specific measures, which focus on land use, adjusting the proposed urban design, water and landscape design, traffic planning and greening building technologies.

These objectives need to be fitted in the context of the Chinese market and need to propose technical and economic feasible concepts.

The concrete assignment in each of the demonstration projects is to assess the preliminary design proposal and suggest sustainable improvements of the design, related to, at least, the topics of water and ecology, traffic and energy, land-use, and building materials, based on the best practices form Dutch and Chinese expert team experiences.

10.4 The Sino-Dutch Methodology

The methodology used to develop these design charrettes consists of a preparation phase, the actual charrette and the reporting phase (Fig. 10.3). In the preparation phase available data is collected, such as the preliminary design for the site, eventual former sustainability reviews or ecological analyses. In negotiation with the developer of the site and the Chinese ministry of Construction, the program and aim for the charrette are discussed and adopted. Third important element of the preparation phase is to identify and commit Chinese and Dutch experts to participate in the design charrette. These expert teams need to be composed in line with the specific assignment and typical problem of the demonstration project site. The design charrette itself consists of three steps. The first step is the official welcoming ceremony and exchange of expertise regarding the proposed preliminary design by the developer and preliminary findings of the Dutch and Chinese expert teams. The second step consists of the design work. In this step the participants are divided over several groups, each with a specific focus area, such as water and ecology, which often includes land use and urban design, energy and transport, and building materials. This step ends with formulating an integrated advice about the sustainability of the preliminary design by the Dutch and Chinese expert teams. The third step of the design charrette process is the sharing and presentation of the findings with the developer and ministerial representatives, including discussion of the results. After the charrette process the last phase is the reporting in the form of a TOR (Terms of Reference) project report.

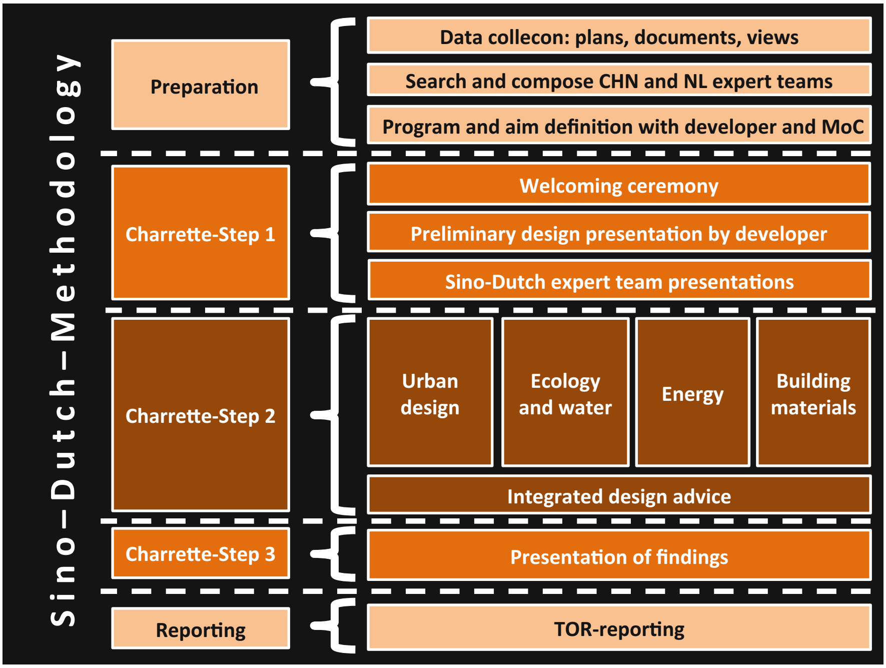

Fig. 10.3 The Sino-Dutch collaborative design charrette methodology

10.5 Program & Participants

The programs of the three demonstration projects (Fig. 10.4) are fairly similar and follow to a large extent the methodology described before. Each of the design charrettes lasts for 2–3 days and is preceded by a welcoming dinner. The three steps of the methodology are followed during each of the projects: opening ceremony, information provision, site visit, design teamwork and the presentation of findings. The charrette is closed with a joint dinner. The participants in the charrettes consist of the Dutch and Chinese expert team, ministerial representatives, a developer delegation and, often the design consultant responsible for the preliminary plan. The Dutch expert team consists of academics and consultants in the field of sustainable building and design. The Chinese expert team consists mainly of academics and students in the field of sustainable building, energy technology and water management.

10.6 Sustainable Chinese Precincts

In each of the demonstration projects the expert teams came to valuable and constructive advise how the preliminary designs could improve their sustainability.

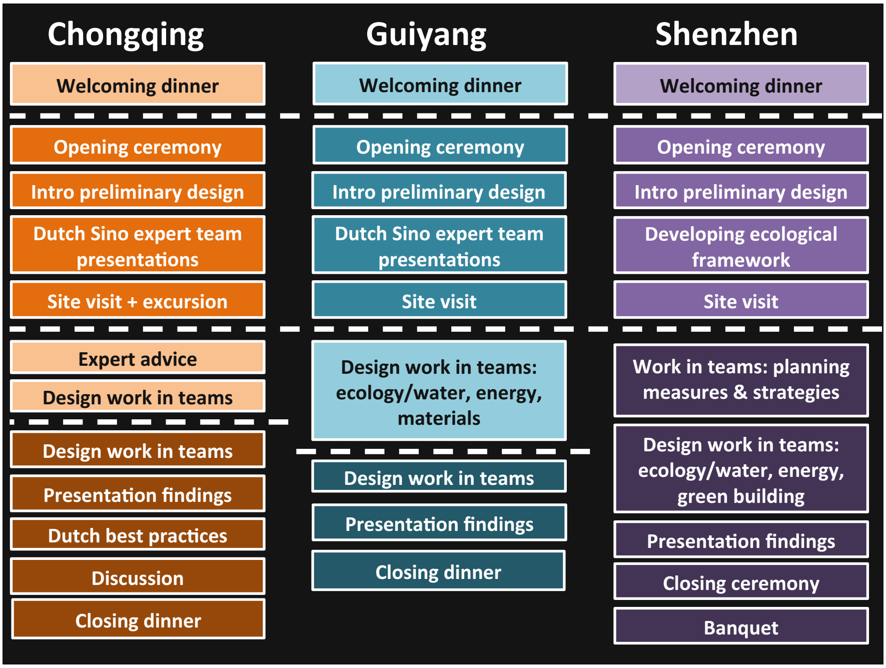

Fig. 10.4 The three charrette programs for Chongqing, Guiyang and Shenzhen in a nutshell

10.6.1 Longhu, Chongqing

The preliminary design for the Longhu site in Chongqing (Fig. 10.5), denies the existing topography as it drapes a field of compact dwellings over the site, to the eastern part aligned with a row of huge towers. An entirely new system of ponds and lakes is created for the site, which is provided with an oversized road system. The design increases heat island effects, especially in summer and decreases biodiversity.

Ecological values, a clean water system and cooling of the site are the major areas of sustainability the preliminary design can improve on. These areas are seen as combined problems. The existing natural system forms the basis for integrated solutions.

The topography determines the local circumstances and opportunities to intervene and increase sustainability. Therefore the first analysis is to categorise the differences in slopes (Fig. 10.6). Four distinct categories are defined: flat, gentle, moderate and steep. Each category has its own characteristics. In flat areas the water is stagnant. Here it can be captured and stored for longer periods. The quality of the water is at risk when standing still, and must be improved through a system of circulation. When water flows the gentle slopes it moves slowly. Therefore it is possible to direct the water where it can be captured and stored: in the flat areas. At the

Fig. 10.5 Preliminary urban design

Fig. 10.6 Categorising slope types: flat (*1*), gentle (*2*), moderate (*3*) and steep (*4*) (Yu et al. 2006)

moderate slopes water flows quicker. The streams in these areas must be lengthened where possible in order to slow the water down. The steep slopes are too steep to control the water. It often runs or even falls down the hill too rapidly. In this area it is difficult to modify the pace or direction of the water.

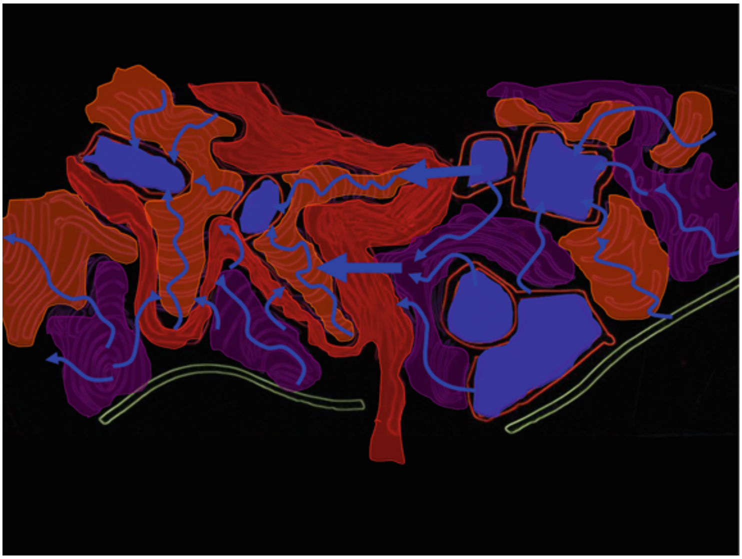

Fig. 10.7 Determining the water flows based on slope steepness (Yu et al. 2006)

Every category of slope-type is connected with a specific water type. The location of the different categories in the landscape determines the logical flow of water from one area to the next (Fig. 10.7). In certain places it is possible to keep the water for a long period (the flat areas, where existing ponds are located). Only when enough water is available or small dams are opened the water is transported to a neighbouring area. Other areas are able to direct the water in streams towards the flatter areas (the gentle slope types) or slow the water down (moderate slopes). The steepest slopes are the places where water runs down without stopping possibility.

The gradients and slopes determine where water can be kept or flows, but it also determines which ecological types can be developed where.

Ecological qualities and the water elements show a strong connection. The ecology of stagnant water differs largely from ecology belonging to gentle and moderate slopes or steep slope ecology. The availability of water, both in quantity as in length of period it stays in a certain location leads to different ecological typologies (Fig. 10.8).

1. The flat area: a balanced eco-aquatic ecosystem. Clean water provides fish and water-plants with enough air and water at flat plains. Water is stored here as much as possible to provide wet circumstances in dry periods;
2. The ecology of gentle and moderate slopes. Grasslands and small bush-lands are providing the ecological environment for a diversity of birds, small wildlife and a wide variety of insects and typical meadow, scrub and forest areas. In these typologies water is used in the plants for growing and only released in hotter circumstances;

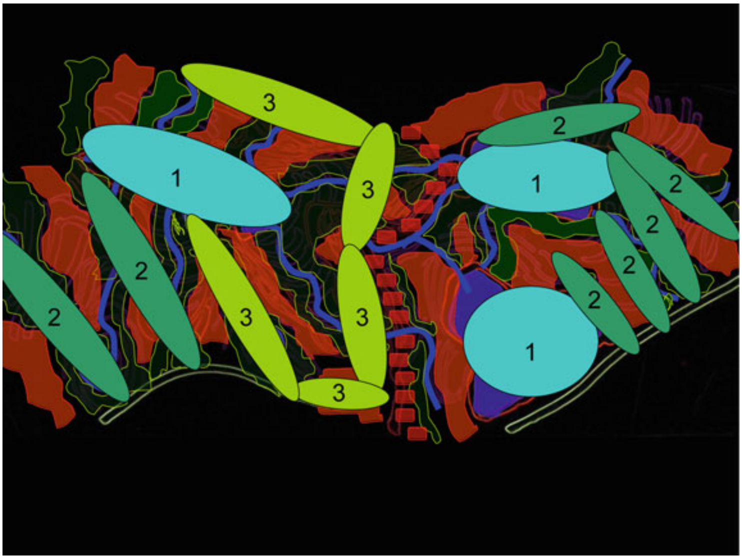

Fig. 10.8 Ecological typologies (Yu et al. 2006)

3. Steep-slope ecology: at the steep slopes the water is running down quickly in the form of waterfalls. Grasses and mosses fill the slopes with vegetation. Humid and fresh circumstances attract specific birds, reptiles and insects;
4. Future façades-ecology. Future buildings are provided with a green façade, creating a habitat for subtropical birds and insects.

The slope typology and according water flows also determines where and how to stimulate natural ventilation. During summer the site gets hot and sticky, which only is expected to increase in the future. Additionally, the urban heat island effect is inevitably introduced to the site when the urban design is realised. Existing water-bodies, where rainwater is stored as long as possible, will have a cooling effect on future urban spaces and are capable of mitigating the urban heat island effect. Further, the different slope expositions form the basis for an enriched ecology, which in itself has a cooling effect on the city.

The hills and plains are used to create natural ventilation, which minimise the effects of rising temperatures. The most natural way of cooling and ventilation to achieve this is to create winds and ventilation. For instance, in between buildings stronger winds occur, creating ventilation (Fig. 10.9). When high-rise buildings are positioned at the northern side of the area stronger ventilation occurs due to the predominant winds from the northwest. The same effect is achieved when buildings are situated at the edge central in the project site, creating ventilation, which cools down the lower parts of the area. When high-rise buildings are positioned in the lower plateaus a cool breeze occurs in the stickiest parts of the site.

Instead of situating buildings at this edge a green belt (Fig. 10.10) achieves the same effect and it also adds more humidity to the air.

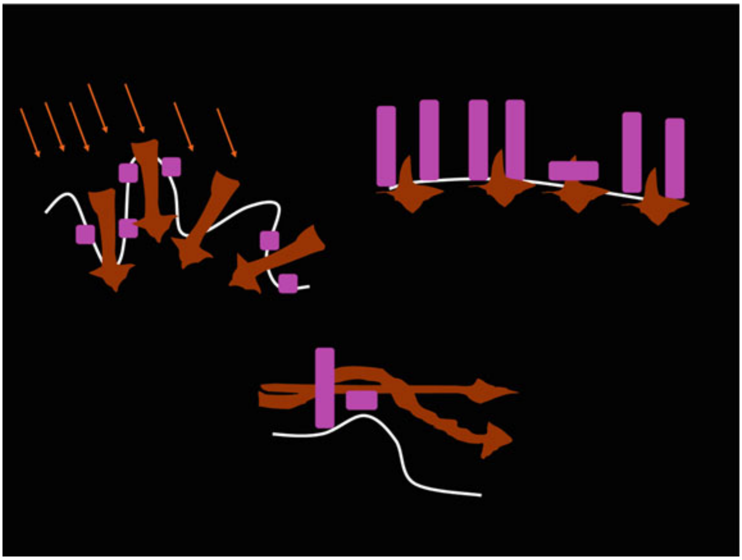

Fig. 10.9 Increasing the natural ventilation by positioning buildings (Source: Yu et al. 2006)

Fig. 10.10 Introduction of a *green belt* (Source: Yu et al. 2006)

Introduction of these natural ventilation interventions does not increase energy use, mitigates the urban heat island effect and creates a more pleasant urban climate.

Positioning of buildings not only improves natural ventilation but it also increases the readability of the landscape. When the tallest buildings are located at the highest

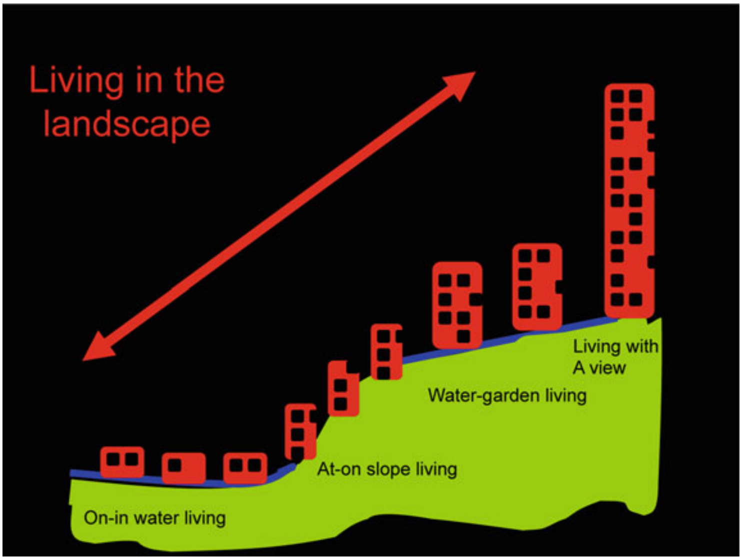

Fig. 10.11 Several residential typologies in the landscape (Yu et al. 2006)

elevation, and smaller buildings at the lowest places of the site, a difference between several residential typologies emerges: ‘On-in Water-living’, ‘At-on Slope-living’, ‘Water-garden-living’ and ‘Living with a view’ (Fig. 10.11).

Water bodies and streams, ecological places, and green belts and building blocks are positioned in relation with each other and are based on the differences the existing landscape has to offer. The existing water system is a very flexible system. When there is a lot of water available it is dispersed to many places and stored in the area. When the landscape undergoes urbanisation it is sustainable to minimal preserve the same amount of surface water in a connected way, but possibly in an adjusted form. Keeping the system connected is important because it is able to incorporate large amounts of water and the water stays for a long time in the area, which makes it available in dry summers.

Based on the slope typology and the water two models have been designed.

The first model ‘Between the Streams’ (Fig. 10.12) creates building sites in between the streams. A system is proposed, which emphasises the streams as the most vulnerable and precious. The streams, mostly part of the gentle and moderate slopes categories, are conserved and kept free of building activities. In order to slow the flow of water down, the streams are elongated through creating additional curves and turns. The streams are separated from the construction sites by brooks and urban green spaces, planned as a buffer between water and building. Skinny but tall buildings marquee the steep edge, forming an elegant ridge in the centre of the site.

The second model ‘Arching the Streams’ (Fig. 10.13) integrates the streams and small-scale buildings. This allows for a large green zone to be connected as one

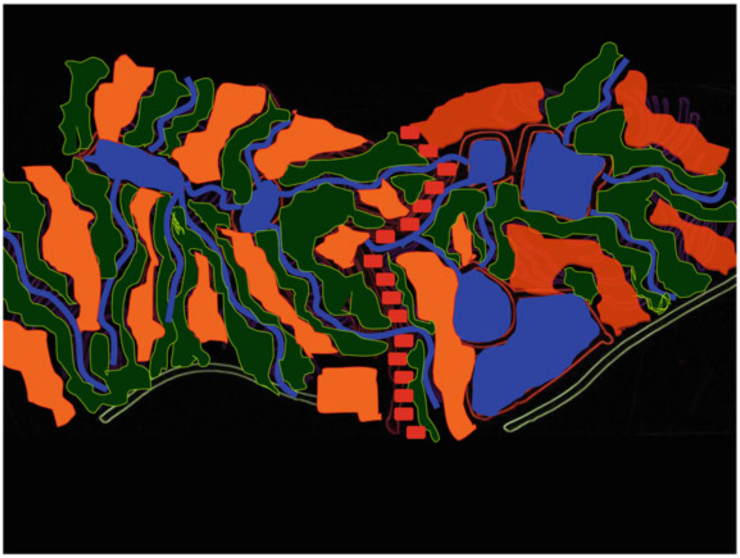

Fig. 10.12 Model ‘Between the Streams’ (Yu et al. 2006)

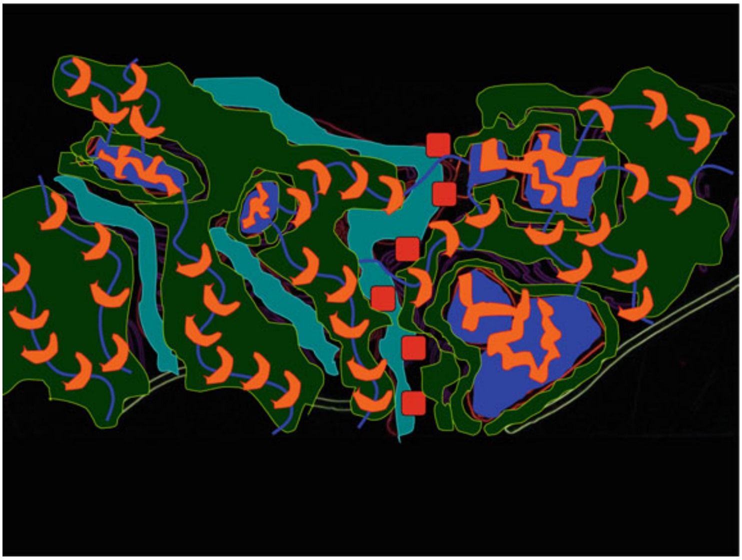

Fig. 10.13 Model ‘Arching the Streams’ (Yu et al. 2006)

green field of forests, within which small and moderately sized buildings are situated. The individual buildings are constructed as arches across the streams. The way these are constructed minimise the their footprint in the landscape, acknowledging the ecological values and biodiversity. The continuous green space, which is

Fig. 10.14 The 'bath-rain-surface' water system (Yu et al. 2006)

connected through the entire site, underpins this ambition once more. The steep edge in the middle of the site is used to locate six high-rise buildings in which different functions and amenities are mixed: shopping centre, offices and residential.

Both these models are able to react and anticipate on future changes in precipitation, natural conditions and rises in temperature.

Based on the natural water system a water-flow scheme is designed (Fig. 10.14). In this 'bath-rain-surface' scheme every water quality is separated from another and cleaned in a specific way. The rainwater discharged from roads (pink) is cleaned through a pre-cleaning filter after which this water is led through several wetlands. Water from baths and showers (orange) is pre-cleaned in a biological way, removing all soaps and other chemical substances, before it is lead through natural wetlands and enters the lakes. Water from ponds (green) is directly cleaned in wetlands, after which this water flows into the lager lakes. Every type of water-quality is brought to a quality level, which is suitable to re-use as grey water in households and in which swimming is possible. Should the water leave the site, the effluent is so clean it doesn't influence the water-quality of the subsequent area.

Previous models and ideas are integrated in one comprehensive integrated vision for a sustainable building development for the demonstration project (Fig. 10.15). In this scheme the choice is made to project buildings between the natural streams. The residential areas are located at the slopes between the streams, while high-rise buildings (in purple) are projected at the plains, connected by two car traffic roads: one through the higher northern part and one cul-de-sac in the lower southern area. At the central edge buildings with the major amenities are located and are combined with a green belt that provides the lower parts with natural ventilation. The site

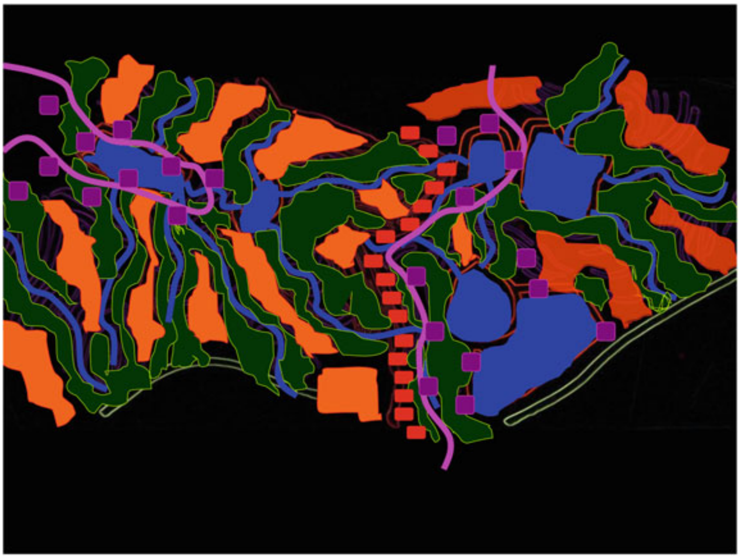

Fig. 10.15 The integrated model (Yu et al. 2006)

stores large amounts of water in a dense water system and the different slope types are used to create according ecological typologies. Natural ventilation, the ecological spaces as well as the water structures provide the area with cooling.

10.6.2 Yu'an and Anjing in Yunyan District, Guiyang

The preliminary design for the area (Fig. 10.16) shows the occupancy of the landscape with a diversity of buildings. The high-rise and smaller sized buildings flock over the hilly terrain as if elevations don't matter. The conceptual choice to put extreme high-rise buildings at the turns and in curves of the river is from a landmark perspective understandable, but disrespects the ecological potentials the shores of the river offer. Moreover, the main hill is built upon in a far from sensitive way, which neglects the ecological values of the mountain forests and doesn't make any difference between the places where buildings are situated and where they aren't.

The density of the area can be increased in certain areas and decreased in others (Fig. 10.17). When the buildings are concentrated along one major road (at 1,140 m altitude and 80 m wide) the total urban development program can be realised, while keeping the rest of the area free from any building activity.

When the mountaintops are kept free from building activities, these areas offer the space for water retention and biodiversity will increase. Moreover, the spatial quality improves, because the mountains stay visible as distinctive landscape

Fig. 10.16 Bird's eye view of the Master Plan (Atkins 2007)

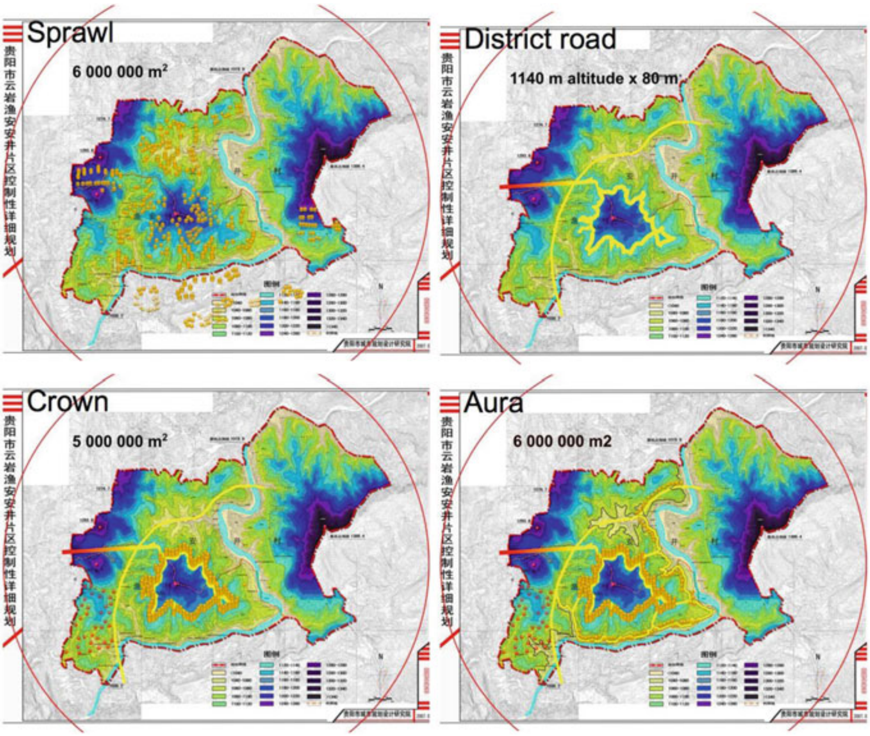

Fig. 10.17 Conceptual analysis of building capacity and the sensitive landscape by Prof. Teake de Jong (Yu et al. 2008a)

Fig. 10.18 'Living on top of the world: the concept of increased building densities and keeping the highest parts of the landscape natural (Yu et al. 2008a)

elements. This concept of keeping mountaintops free of buildings is called: 'Living on Top of the World' (Fig. 10.18).

The ambition is to increase the biodiversity on the hill and to provide enough water year round for drinking water and nurturing the landscape. The design proposes to minimise the impact on the landscape and realise the building program in a smaller area at the same time. An increase of biodiversity and harvesting enough rainwater can be reached if the available water is stored on the hills and the hillsides as long as possible. At every altitude level of the hill solutions have to contribute to cleaning and storage of rainwater (Fig. 10.19).

1. **Mountain Top**. The summits of mountains are excluded of any form of building. In these areas water is retained and the natural quality and biodiversity is contained and improved. Additionally, rainwater is stored at the mountaintops to enhance biodiversity.
2. **Edge1140**. At an elevation of 1,140 m an edge is created, where a central road is suggested. Alongside this road the high-rise buildings are concentrated. The use of the road is maximised and the length of roads, cables and pipelines is minimised. In this zone rainwater is collected and stored. In the summertime the water is stored in basins, where it can be used as grey water in the high-rise buildings. In the wintertime rainwater is used in the high-rise or flows further downhill. On top of the high-rise buildings green roofs are proposed to keep the water high on the hills.
3. **Slope**. The slopes, especially the steeper ones are not used for building activities. They are kept green in order to improve their ecological quality and biodiversity.

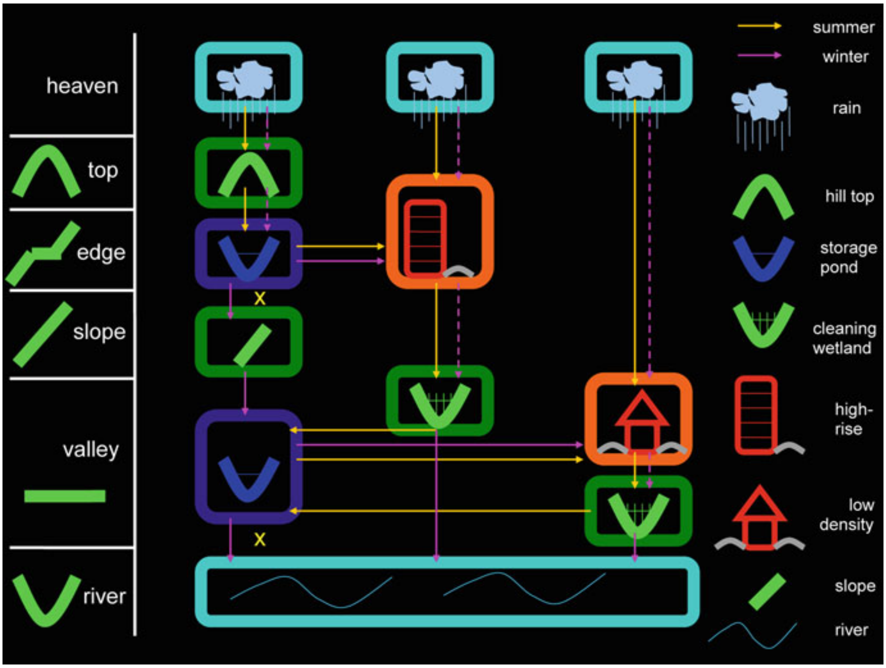

Fig. 10.19 Landscape typologies and appropriate rainwater measures (Yu et al. 2008a)

Green slopes are also able to clean rainwater from roofs and roads in 'vertical wetlands'. At the bottom of the slopes this cleaned water is collected in basins.

4. **Valley1060**. The edge of the valley can be used to store cleaned water from the slopes and collect all the rainwater, which is falling in this zone. In summer rainwater is retained and used as grey water in low-density buildings, which are concentrated at the edges of Valley1060. Water from roofs and roads is cleaned in wetlands. This clean water is in summer stored in basins, while discharged directly to the river in the winter. To keep the rainwater as long as possible in the area green roofs are applied, rainwater is infiltrated in the soil and the water is filtrated in sand-beds.
5. **River**. The edges of the river are the last chance to clean rainwater from roads and roofs before it flows in the river. When wetlands are located at the edge of the river the water is cleaned before it enters the river. Only in winter clean water flows into the river, while in summer the collected water is re-used in the low density buildings close by.

When these principles are applied (Fig. 10.20) high-rise buildings are concentrated and situated at Edge1140, while low-density buildings are located at the edge of the valley. This results in larger areas free of building activities and in an improved biodiversity and higher quality of green space. Moreover, it increases space for

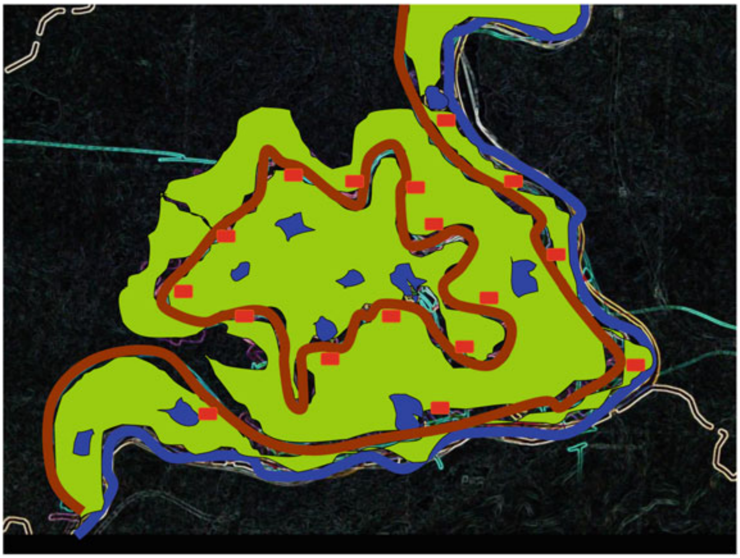

Fig. 10.20 The design principles applied in the site (Yu et al. 2008a)

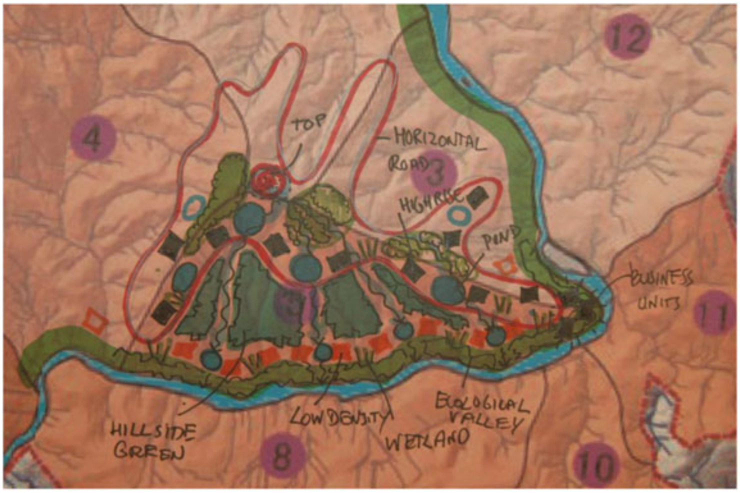

Fig. 10.21 Detailed design for one water catchment area (Yu et al. 2008a)

water retention and creates a open ecological zone alongside the river, which is extremely important as the basis for ecological development.

In greater detail, the same concept is applied in the design of one distinct water-catchment area (Fig. 10.21). The hilltop is reserved to grow a forest and rainwater falling in this area is stored to supply the trees. At ‘Edge1140’ high-rise buildings

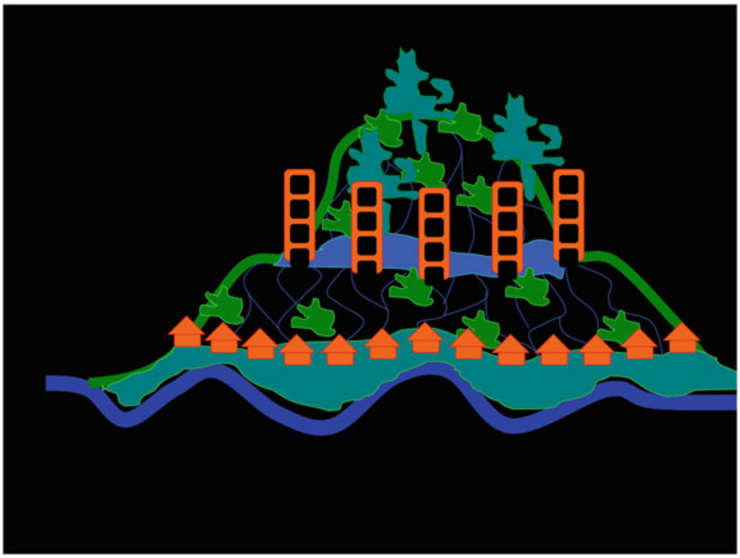

Fig. 10.22 The cake with crown and collar (Yu et al. 2008a)

are concentrated alongside the road and are surrounded by ponds to collect and store rainwater, and reed beds to clean roof- and road-water. The steepest slopes are planted with native plants and prevent the slopes from erosion. In the 'Valley1060' area low-density buildings are concentrated and accompanied by wetlands to clean roof- and road-water, and ponds to retain rainwater before it enters the river. The river valley is kept free of buildings in order to give room to ecological processes alongside and in the river. The ecological banks are functioning as a green zone, where native wildlife has the chance to develop. There is minimal co-use possible in this area, such as for instance extensive recreation, traffic on bikes or by foot and hot springs.

Implementing this concentrated building concept results in a landscape that regenerates its original quality and beauty. Distinct building zones are combined with but separated from specific ecological zones. The mountain looks as a cake (Fig. 10.22): it has a crown around the top and a collar at its base, an image that is currently already visible in parts of Guiyang (Fig. 10.23).

10.6.3 Vanke's Stream Valley, Shenzhen

The ecological system in Stream Valley differs in the southern, uphill areas and the northern, downhill area (Fig. 10.24). Ecological qualities are strongly linked to the water system and the availability of streaming water, which is required year round. Ecological performance differs between the northern and southern slopes. The

Fig. 10.23 Existing Cake-concept visible in Guiyang: hilltops free of buildings (Photo: Tracy Zheng)

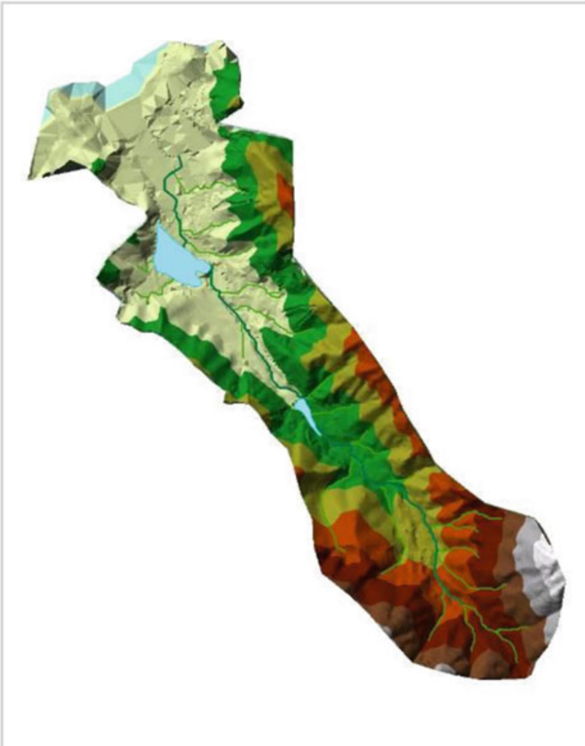

Fig. 10.24 Slopes and elevation (Yu et al. 2008b)

northern slopes have a relatively low quality and are mostly degraded. Grassy plants of low ecological value overgrow the northern slope step-by-step, leading to a decreased quality. This process is difficult to stop and turn around into an ecological more valuable system. A simple removal of these grassy plants might not be a good idea because this leads to sliding down of the plants uphill, which diminishes all ecological qualities. Creating wet and stable habitats uphill might be the better

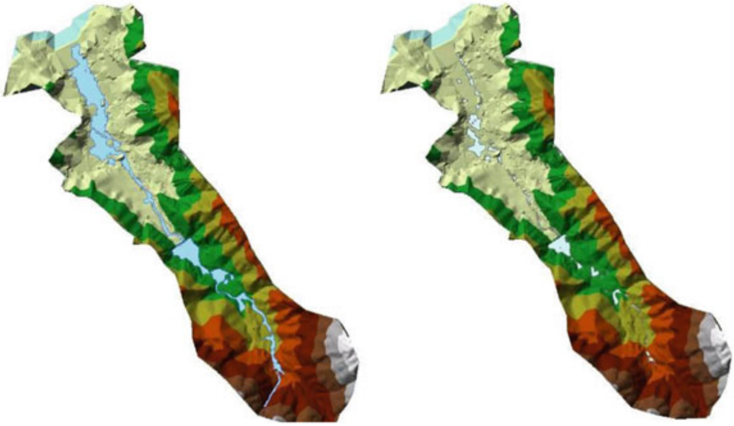

Fig. 10.25 Amount of water in summer (*left*) and winter (*right*) (Yu et al. 2008b)

solution. These newly created 'hotspots' are capable to function as new centres of dispersion and feed other areas downhill. The southern slope on the other side is ecologically much richer and more in balance. But even there, creation of these new hotspots supports the ecological system.

The water-function at the project level is based on the existing elevation and slopes (Fig. 10.24). Water storage and retention is most logical located in the lower and flat areas, while runoff water, feeding the streams, is naturally found uphill. This typology of natural functions is used to increase the future sustainability. The difference between the summer and winter period is evident (Fig. 10.25). The summer period is wet and humid and nearly all the rain falls in this period. The winter period is less warm and can be extremely dry. Precipitation in winter is minimal or even completely absent. This impacts the project area, as there is more water available in summer, which is currently discharged rapidly and leaves the area. To prevent the streams from flooding the water is discharged as quickly as possible. In winter period the water level drops considerably and nearly no water is discharged anymore. By the end of the winter period, in May, the water level is at its lowest and the area can no longer function as a resource for drinking water. The shortage at the end of winter leads also to a decreased water quality. There should be more water captured and stored in summer in order to keep enough water in the system for the winter period.

When more water is stored in summer and the overall biodiversity can be increased an interesting area with high qualities will be realised. The area is very vulnerable and therefore the strategy to restore the water and ecological qualities before any building activities take place is chosen. When buildings are realised they should be kept footloose from the underlying natural system of water, soil and ecology. The step-by-step strategy safeguards the main stream (Fig. 10.26) first and creates space for side streams (Fig. 10.27) and ponds (Fig. 10.28), which increase the storage capacity, slow down the discharge in summer and preserve water for the drier winter period.

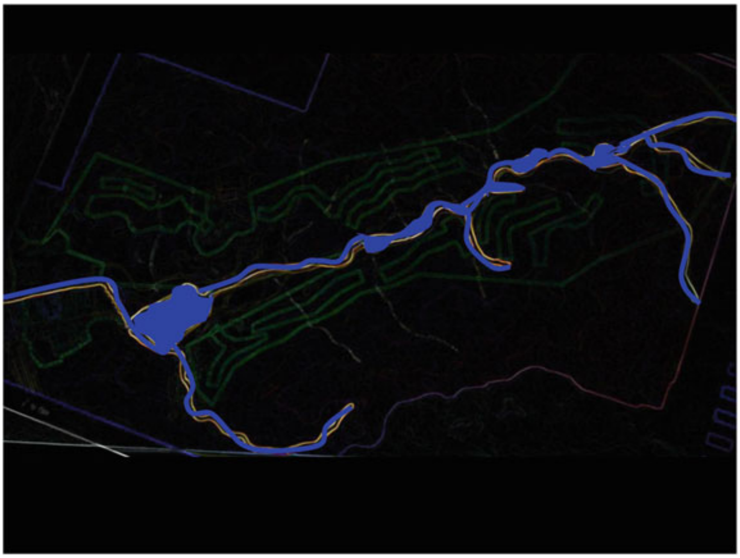

Fig. 10.26 The main stream and existing storage lake (Yu et al. 2008b)

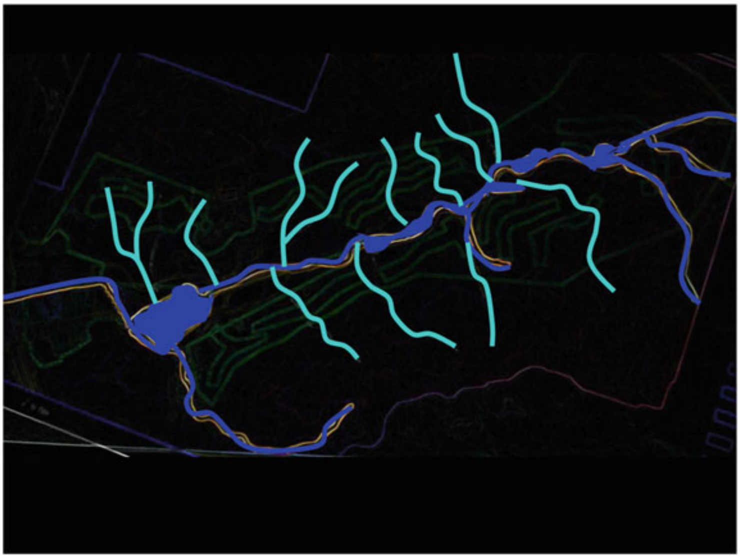

Fig. 10.27 The side-streams (Yu et al. 2008b)

The side streams should function undisturbed and this requires enough space at both sides around them. The many side streams and their required space are respected in every building. The side streams also store and slow down runoff water. In order to slow down the runoff, rocks might be placed in the streams (Fig. 10.29).

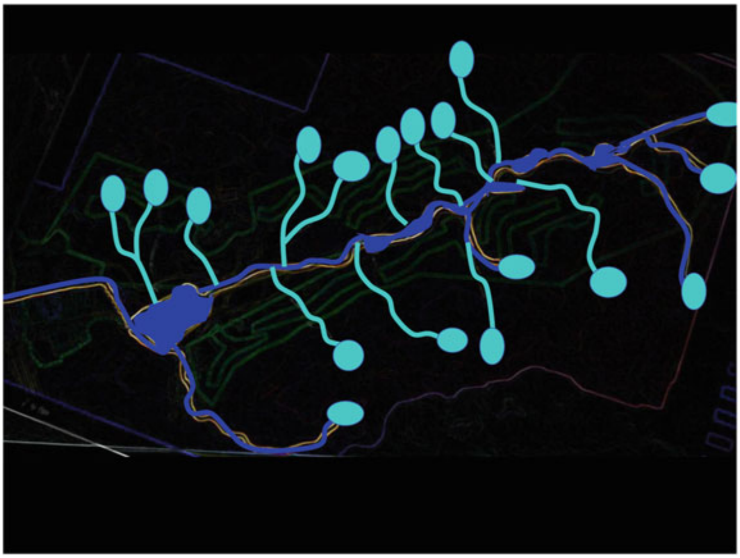

Fig. 10.28 Ponds situated at the higher ranges of the hills (Yu et al. 2008b)

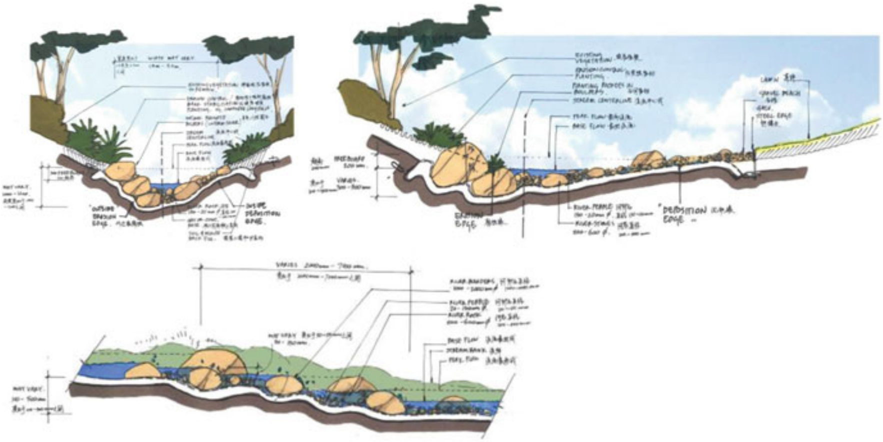

Fig. 10.29 Cross-sections of possible measures to slow down runoff water (Yu et al. 2008b)

Where-ever small flat spaces can be found half way uphill storage ponds can be realised. These ponds not only store water, but function also as ecological hotspots. Water is essential to increase biodiversity and especially in dry winter periods these ponds function as ecological cores. These ponds are realised by placing groups of rocks in the streams (Fig. 10.30).

Water running off the hill can be cleaned extra in a natural way. Even if the water is very clean already, the introduction of natural wetlands before water from side streams enters the central stream is encouraged (Fig. 10.31).

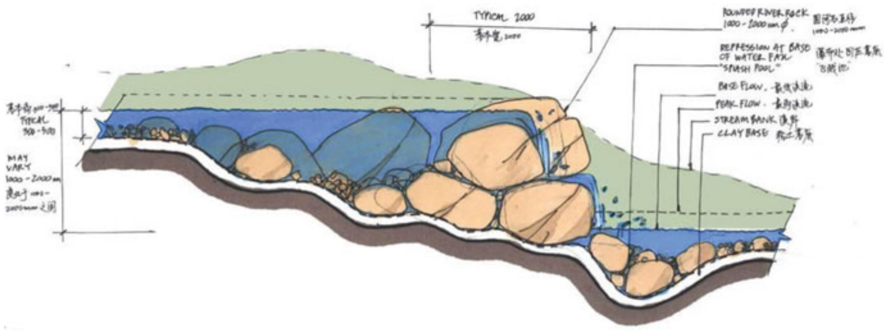

Fig. 10.30 Cross section of creation of ponds (Yu et al. 2008b)

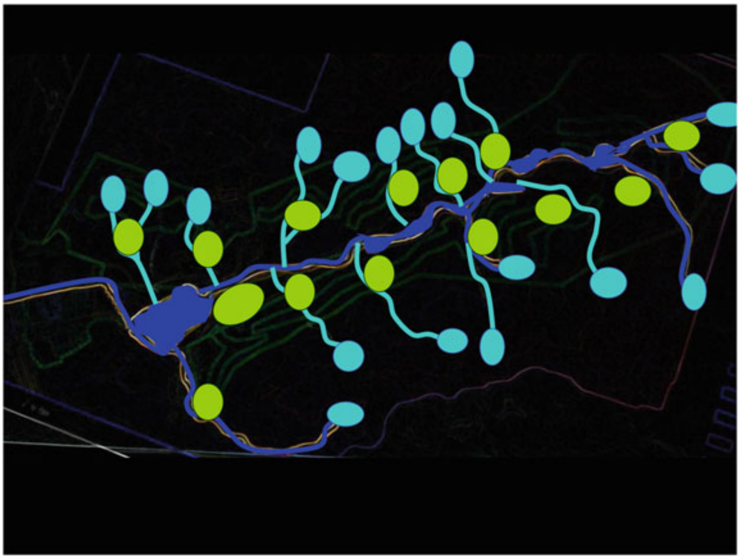

Fig. 10.31 Introducing wetlands cleaning the water before entering the side streams (Yu et al. 2008b)

When wetlands are created before any building activities take place, the water quality is increased anticipating developments later on that may influence the water quality. At a later stage, water from roads can be cleaned in these, already functioning, wetlands. This improved water and ecological system already operates before a first minimal impact road is constructed and the first houses are built. These houses are build with minimal impact on their environment, during building and afterwards by lifting the houses above the landscape (Fig. 10.32).

The first buildings should be built at the northern slopes, because the relatively low ecological values at that hillside (Fig. 10.33).

Fig. 10.32 Minimising the footprint of buildings on natural landscape (Yu et al. 2008b)

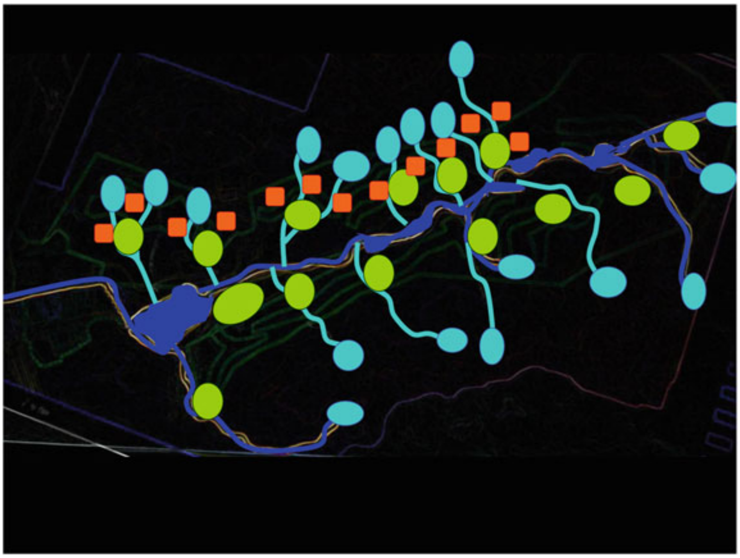

Fig. 10.33 First houses built at the northern slope (Yu et al. 2008b)

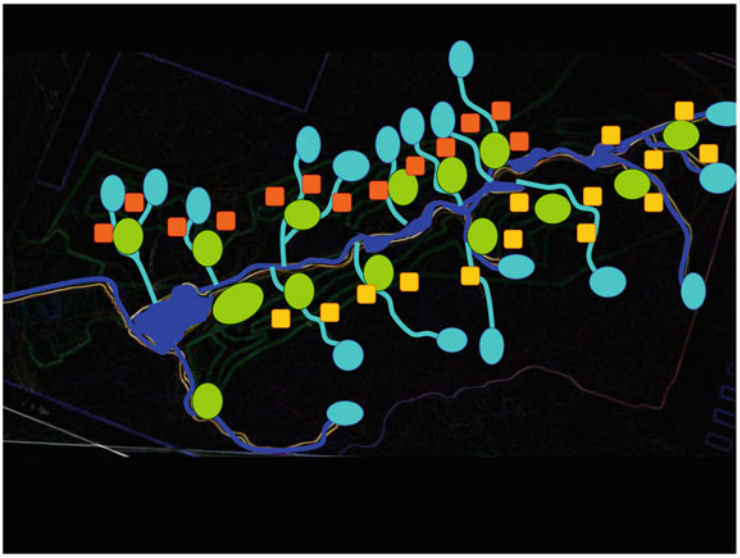

Fig. 10.34 The last houses are built at the most vulnerable southern slope (Yu et al. 2008b)

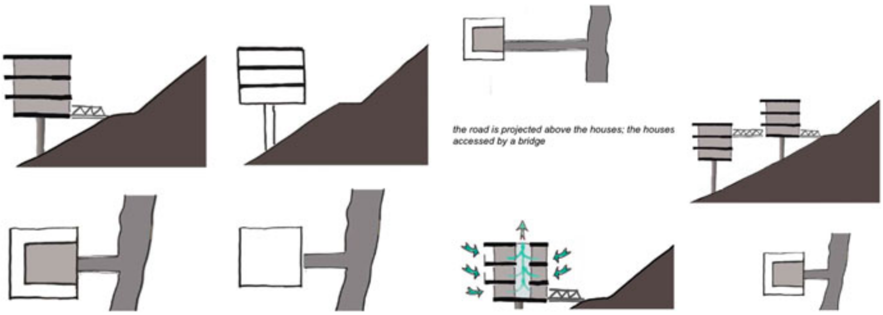

Fig. 10.35 The house designed like a tree in the landscape, connected by a bridge and ventilated through the chimney effect (Yu et al. 2008b)

Building in a piece-by-piece way, the building process can be stopped any time. The most valuable parts of Stream Valley are occupied latest (Fig. 10.34).

The construction of the houses with minimal impact on landscape and ecology, and improving sustainability in comfort and energy use at the same time can be visualised in several steps (Fig. 10.35). The house is built on one pole, just like a tree, and connected with the road with a bridge (Fig. 10.36). The house provides shade beneath it on the hillside. Within the houses natural ventilation is achieved through the so-called chimney effect.

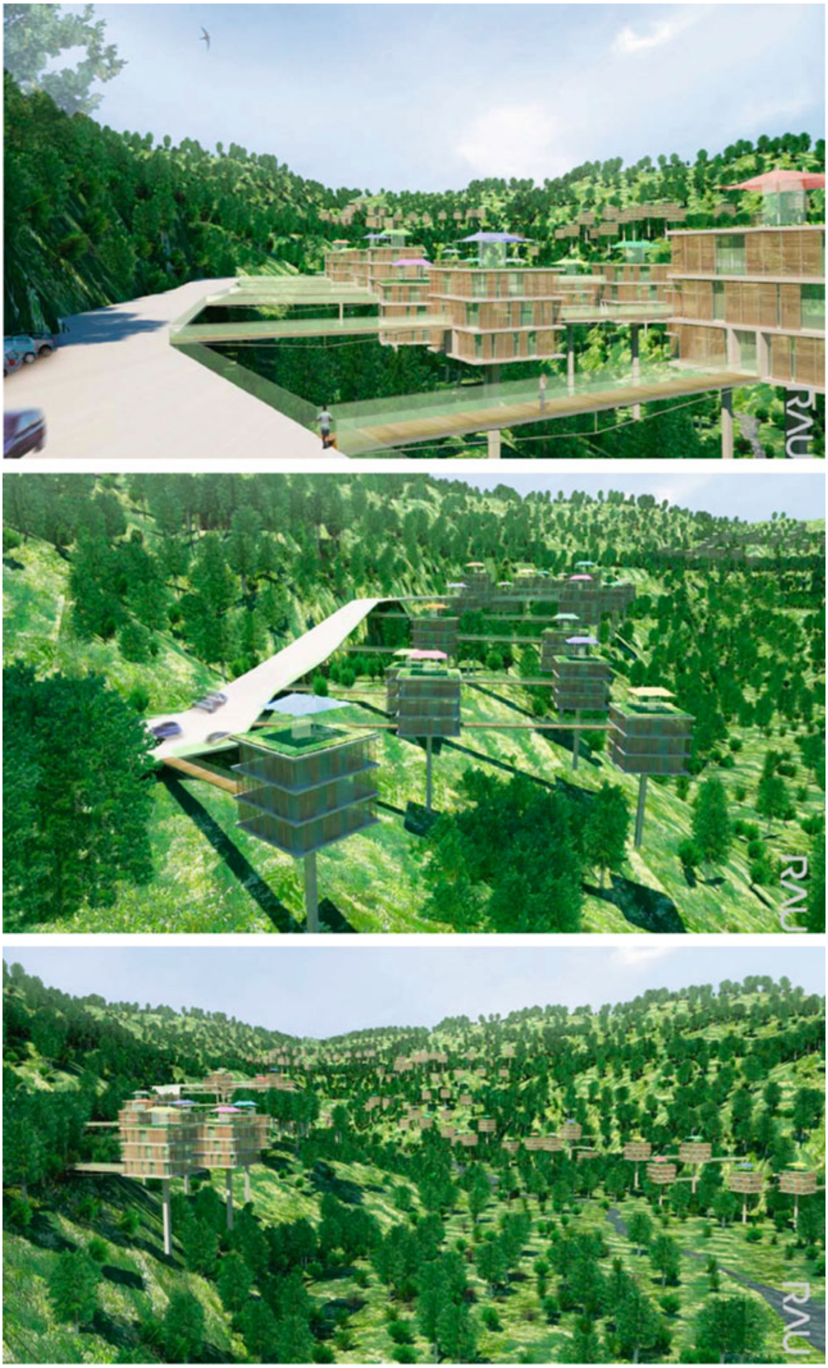

Fig. 10.36 Visualisations of the design for Stream Valley (Yu et al. 2008b; artist impressions: RAU & Partners Architektenburo BV)

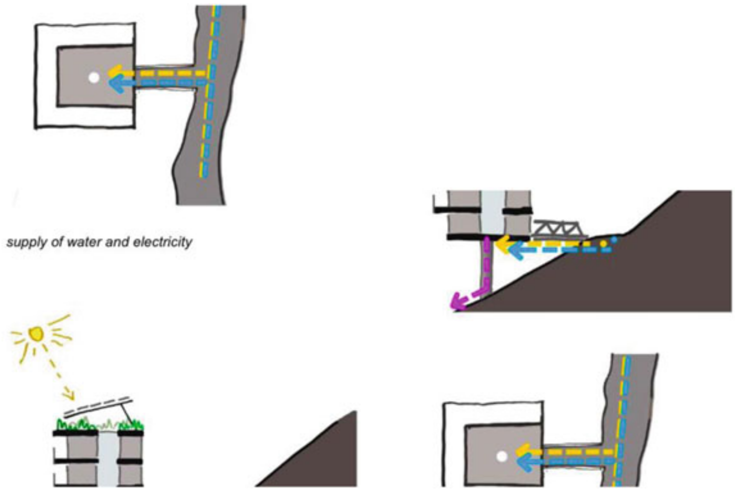

Fig. 10.37 The water, electricity and sewage solutions (Yu et al. 2008b)

Water and electricity is provided from the road and the sewage system is organized through the pole. The required amount of external electricity is minimised by the placing PV-panels on the roofs (Fig. 10.37).

10.7 Success Factors

The design charrettes that have been organised to improve the sustainability level of several demonstration-building projects in China have been successful because of several reasons:

1. There was a strong support from the Ministries from both countries and an active participation of representatives of the Chinese Ministry of Construction in the design charrettes.
2. During the design charrettes a broad pallet of expertise was combined. Experts both from China and the Netherlands brought different backgrounds to the table as well as specific knowledge about landscape and urban design, water and ecological systems, energy and transport as well as building materials. As far as backgrounds differed, also the range at which knowledge could be gathered could be derived from different scales.
3. The Dutch high standards of knowledge regarding sustainability in general and sustainable building in particular could be brought in very hospitable and receiving environment of Chinese developers and the government.
4. The fact that during the design charrettes an atmosphere of collaborative designing was created. This involved skills that go beyond explicit knowledge, but

	Individual or collective learning	Nature of learning domain	Kolb experimental learning cycle	Depth of learning impact
Distributive	Individual	Tame problems Technical challenges	Conceptualisa-tion only	First level learning
Interactive	Individual	Tame problems Technical challenges	Conceptualisa-tion and experimenting with new behaviour	First or second learning level
Collaborative	Collective and individual	Wicked problems Adaptive challenges	All stages of cycle (and multiple times)	Third learning level

Fig. 10.38 Learning level in the Sino-Dutch design charrettes

skills to make contact across cultures and a genuine interest in different contexts, cultures and background.

5. During the design charrettes there was the mental space to sketch and draw together with the designers of the preliminary design and the developers, without any preoccupation about the qualities of the preliminary plan. This meant that everything was discussable and new solutions were seriously discussed on the drawing board.
6. There were translators available with understanding and communicative skills, enhancing the communication process and the professional exchange
7. The mediation skills of the Dutch team leader, Bing Yu, who has Chinese roots is trilingual, speaking Mandarin, English and Dutch and is trusted by the two expert teams, the Chinese government and the developers.
8. The appearance of a spider in the web of Chinese academia, Dutch consultancies and academia, Chinese developers and the Ministry of Construction, Bing Yu again.

Learning during the design charrettes was collaborative and searching for new concepts and experiments. However, time constraints limited the space for reflective observations, and the major problems tackled focused primarily on the more technical challenges of sustainable building. The level of learning therefore is interactive, and at the second level depth (Fig. 10.38).

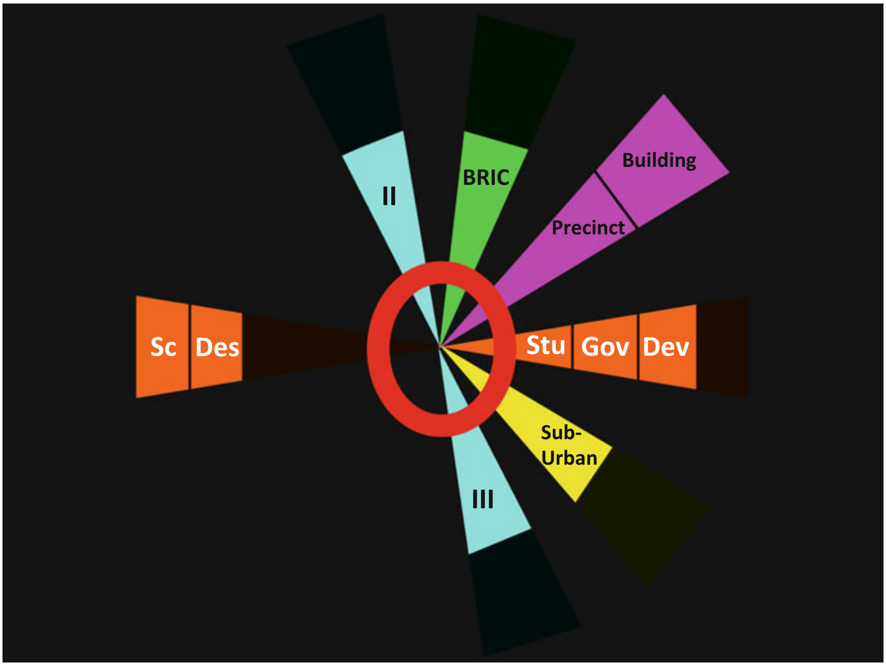

Fig. 10.39 The Sino-Dutch design charrettes positioned in the charrette wheel

10.8 Chinese TOR's in the Charrette Wheel

The Sino-Dutch design charrettes were all held in China, and consisted of assignment focusing on suburban precincts and the building level. The issues were complex and tame at the same time, as they focused on integrated designs for sustainability, but were also dominated by definition of simple rules, regulations and techniques for sustainable building. The variety of participants was wide, with academics from China and the Netherlands, Dutch consultants and designers, developers and government representatives and Chinese students (Fig. 10.39).

10.9 Conclusion

The three Chinese demonstration projects are sustainable building demonstration projects. This simple fact makes it not more than logical that these plans represent a relatively high level of sustainability. Through this it is not declared that all building projects in China perform high sustainability.

In executing and collaborating in the Chinese design charrettes the Chinese context is different from the Western.

First of all, the pace of developments is fundamentally different. The full continue workforce in the building sector leads to designing almost *during* the on-going building process. This offers chances, but contains difficulties too. The chances can be found in the fact that a design is never final until it is built. This means that until the very last phase of planning and design new, more sustainable measures can be integrated in the plan. The flipside of it is that processes are so fast it is hardly possible to propose changes because the actuality changes every day.

The second aspect of the Chinese context is the strong hierarchy. Central regulations will be carried out throughout the country and will be executed immediately. Until a certain measure is declared from the central government no one would think about these measures, set aside realising these. But as soon a declaration from Beijing is promulgated, everyone implements it. This results in a very effective implementation of measures once the National Congress of the Communist Party adopts them.

The last relevant contextual element is the competitiveness between Chinese project developers. These parties are conscious of the fact that they can profit from rapid developments, but in order to continue their building pace and selling schemes, they need to distinguish themselves from the others. This makes green building popular and the developers have a strong emphasis on becoming a demonstration project. This competing and scoring in trying to be the best developer leads also to immediate implementation of proposed measures. The three demonstration projects illustrate that incorporation of measures is relatively easily. The measures direct the character and layout of the design and contribute to the resiliency of the entire area. The problematic issues in these Chinese examples are unbalances in water availability and the decrease of biodiversity.

The Chinese projects show that if the natural circumstances, like elevation, slopes, water and ecology are taken as central steering elements in the design the sustainability of the project area can be improved. The designs for the various areas are integrated designs. It seems that in the Chinese context sustainability measures are not seen as new ingredient, which therefore have less difficulties to fit in an old fashioned planning tradition. Besides this, policy makers, designers and project developers are open to incorporate sustainability issues in the designs. Compared to the Dutch examples and situation, the Chinese attitude seems more susceptible to these issues. In the Chinese examples the project developer works together with the central government and scientific experts in a design project. This is not a regular practice in many Western contexts.

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Chapter 11
Learning by Practice, High-Pressure Student Ateliers

Wim Timmermans, Juanee Cilliers, Andres Garcia, Ad Koolen, Ad Woudstra, and Terry van Dijk

11.1 Introduction

For a long time it has been the aim of science education reformers to engage learners in the excitement of science, to help them discover the value of evidence-based reasoning and higher-order cognitive skills, and to teach them to become creative problem solvers. But the means to achieve these goals, especially methods to promote creative thinking in scientific problem solving, have not become widely known or used (De Haan 2009). Students have increasingly become involved in the improvement and enhancement of their own learning experiences (Alaniska et al. 2006: 5).

Cognitive flexibility and creative thinking have become crucial skills to include and develop in the teaching-learning process. This paper illustrate that these skills can also contribute to the broader planning process and be beneficial to local authority planning, when students were part of interactive workshops, addressing and planning

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for actual problems within modern environments. Cognitive flexibility has been described as the mental ability to switch between thinking about two different concepts, and to think about multiple concepts simultaneously (Scott 1962). Cognitive flexibility can be seen from a variety of viewpoints. A synthesized research definition of cognitive flexibility is a switch in thinking, whether that is specifically based on a switch in rules or broadly based on a need to switch one's previous beliefs or thoughts to new situations. Moreover, it refers to simultaneously considering multiple aspects of thought at once, whether they are two aspects of a specific object, or many aspects of a complex situation. Cognitive flexibility has been more broadly described as the ability to adjust one's thinking from old situations to new situations as well as the ability to overcome responses or thinking that have become habitual and adapt to new situations (Moore and Malinowski 2009; Deak 2003). Cognitive flexibility has thus been defined as having the understanding and awareness of all possible options and alternatives simultaneously within any given situation (Martin and Rubin 1995).

The importance of creativity and innovation in addressing the economic, environmental and social crises has been recognized in policy discussion in Europe (Cachia et al. 2010: 9). Creativity is perceived in European policies as the prime source for innovation, which in turn is acknowledged as the main driver of sustainable economic development (Council of the European Union 2008, 2009). Creativity should be conceptualized as a transversal and cross-curricular skill in the educational context, in order to develop, foster and inhibit this skill (Cachia et al. 2010: 9). Literature shows that creativity is conceptualised in different ways by different people. It can be seen as arts-centred or as relevant to any domain of knowledge. It can also be seen as a quality some geniuses have or as a skill that anyone can develop.

11.2 High-Pressure Student Ateliers

High-pressure student ateliers are of growing importance in landscape architecture education at Van Hall Larenstein, originally starting with the rural ateliers (Meijles and Van Hoven 2010), while now more and more an urban setting is chosen (Branderhorst et al. 2008; Branderhorst 2012, 2013; Hulsebosch 2009; VHL 2011a, b, c; Van der Linden et al. 2012). The ateliers last at least a full week; students sometimes work 24 hour a day; many levels of stakeholders are involved informing the students and discussing intermediate results; student groups are international and interdisciplinary with landscape architects always presented. A final presentation and discussion with representatives of local authorities and stakeholders is common. The following questions are raised:

1. What are the benefits of the ateliers?
2. What are students and teaching staff learning?
3. Is there a gain for local authorities and stakeholders?

We try to answer these questions analysing two international high-pressure student ateliers.

11.3 Goal of the Ateliers

The high-pressure student ateliers have different goals (Meijles and Van Hoven 2010). They connect university education with the working field; provide an innovative, interdisciplinary and often also international learning environment for students offering them real life problems to be solved, so that they can develop ‘professional’ skills. For local and regional authorities the ateliers offer the work of young developing, critical and cognitively flexible professionals, able to overcome sectors and think in a spatial and conceptual way through the different levels of scale. The Greek nature reserve of Strofylia is vulnerable to climate change. So far authorities focus on management measures by services and departments, working independendly from each other. The regional authorities feel the necessity of an integral approach involving all local and regional stakeholders. In May 2012 they asked a group of Greek, Albanian, Spanish and Dutch students to compile a vision for the future (Branderhorst 2012). Another group of Spanish and Dutch students spent a week in October 2012 studying the options for local food strategies and urban agriculture in the Spanish city of Lugo in Galicia in an attempt to put the issue on the local agenda. Both ateliers have been organised as part of the EU INTERREG F:ACTS!-project (www.factsproject.eu), which has been established to explore territorial strategies for climate change adaptation in Europe (Garcia et al. 2012).

11.4 Problem Based Learning

We consider the high-pressure student atelier as Problem Based Learning, which plays an important role in the Dutch education system (Meijles and Van Hoven 2010; Moust et al. 2005). Problem Based Learning originates from medical disciplines and ‘works with ‘messy and ill-structured’ problems (Drennon 2005: 386) like those occurring in a working day of a medical professional’ (Meijles and Van Hoven 2010). Geography and more precise land use planning and territorial development deal with so called wicked problems facing interdisciplinary challenges and strong uncertainties in time (Roggema 2012; Timmermans et al. 2011). Meijles and Van Hoven (2010) describe Problem Based Learning used in rural design ateliers. Problem Based Learning starts with a problem, which requires certain knowledge and skills among the students who work in groups and search for acceptable solutions. The students not only rely on their educational skills and knowledge, they also use personal skills and strengths. Van der Linden et al. (2012) let students set up a Youth Agenda for the province of Friesland (North Netherlands) to face the problem of population decline. The Youth Agenda has been set up in co creation with hundreds of young people using manifestations, parties and short events, combining the student’s professional skills with their real life experiences. In fact students and tutors decided to change the project's focus from problem oriented into chance oriented, which approach is more in line with the student's own attitude to life. In this approach, students created new and unexpected solutions for an existing problem, they added new knowledge (Spronken-Smith et al. 2007). The high-pressure student ateliers go further than traditional Problem Based Learning because they place students in a real life local or regional problem and force them into their future role of planner or consultant (Bradbeer and Livingstone 1996; Drennon 2005). Furthermore, the ateliers differ because their aim is not just to solve a problem, but also to set new ideas and approaches on the local or regional agenda. There is a growing awareness of the relevance of ateliers combining education with local and regional problems in planning and geography (Meijles and Van Hoven 2010; Spronken-Smith et al. 2007; Pawson and Teather 2002; Le Heron et al. 2006; Healey 2005). Two case studies are analysed, of which the first one explores the possibilities of scenario planning in Strofylia while the second one attempts to set local food strategies on the local agenda in the city of Lugo.

11.5 Strofylia Workshop: Hercules and Sustainable Recycling

Strofylia consists of a forested coastal strip at the western Peloponnesus in Greece, unique because of the sand dunes, wetlands and the woods which are home to the rare stone pine (Pinus pinea, also known as the umbrella pine), which can only be found in two other places in Greece.

Farming and tourism are on the increase in Strofylia and are starting to damage the countryside. There is illegal camping, illegal hunting and illegal logging. The summer droughts are increasing the risk of forest fires. Complicating factor is the number of different organisations and public authorities responsible for various affairs in the area.

The organisation in charge of the area, the Management Body of Strofylia, has few resources and few powers. A development vision for Strofylia is felt highly necessary, but experience is lacking. Around 20 students from 4 European countries gathered to develop possible future scenarios for the area in a high-pressure student atelier.

11.5.1 Strofylia Atelier Process

In the Strofylia atelier process (Fig. 11.1), the students have been divided in three working groups. On the first day a field trip (Fig. 11.2) was organised providing the opportunity to interview different stakeholders in the area: a farmer,

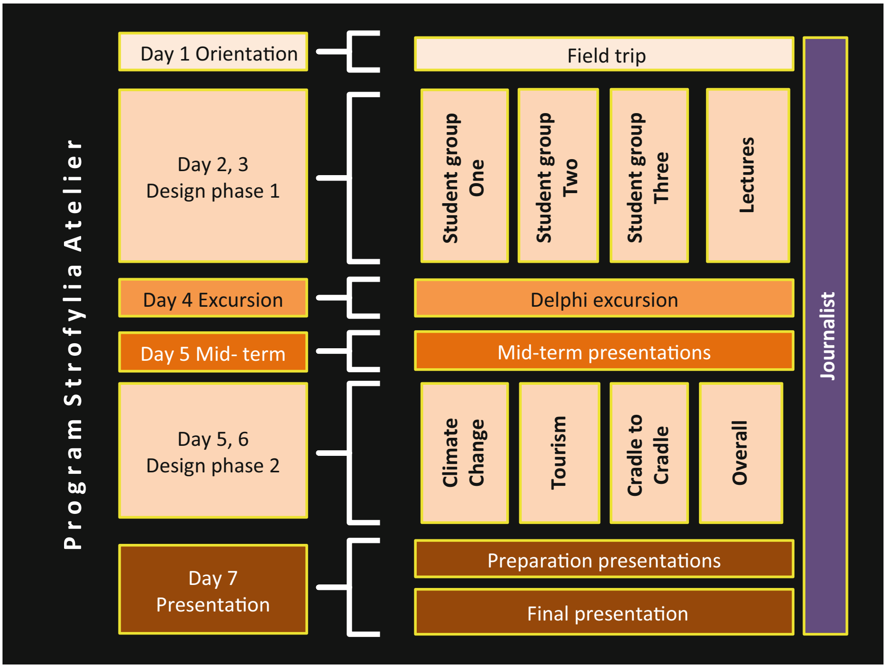

Fig. 11.1 The process of the Strofylia Atelier

Fig. 11.2 Impression of the field trip and stakeholder interviews (Photo: Mario Crecente)

Fig. 11.3 The atelier participants listening to and discussing the lectures (Photo: Mario Crecente)

a hotel owner, a forester, a nature conservationist, staff at the Management Body and two deputy mayors.

During the atelier lectures were given by teaching staff from different disciplines as landscape architecture, cultural heritage and tourism, ecology and Cradle to Cradle (Fig. 11.3).

Midway the atelier, a tourist trip was organised to the Delphi Oracle. Students get an overdose of knowledge and information and then need to come up with solutions with minimal supervision. The groups have to give a midterm presentation to the teaching staff and a final presentation to the teaching staff, the stakeholders and local and regional politicians and policy makers. A journalist has been visiting the atelier for the whole week with a focus on lessons learned by students and staff and has written several publications on it (Branderhorst 2012).

At the midterm presentation it turned out that the three groups were working on three different scales. The teachers decided to launch a fourth group that has been assigned the task of making the links and creating an overall story and bringing some cohesiveness between these different scales.

At the final presentation the overall group presents a film with dramatic images of burning forests, floods and parched soil, accompanied by depressing music. "But that was before the coming of the students." At this moment the music switches to a heroic tune, with a series of images of dunes being raised, irrigation, fire fighting

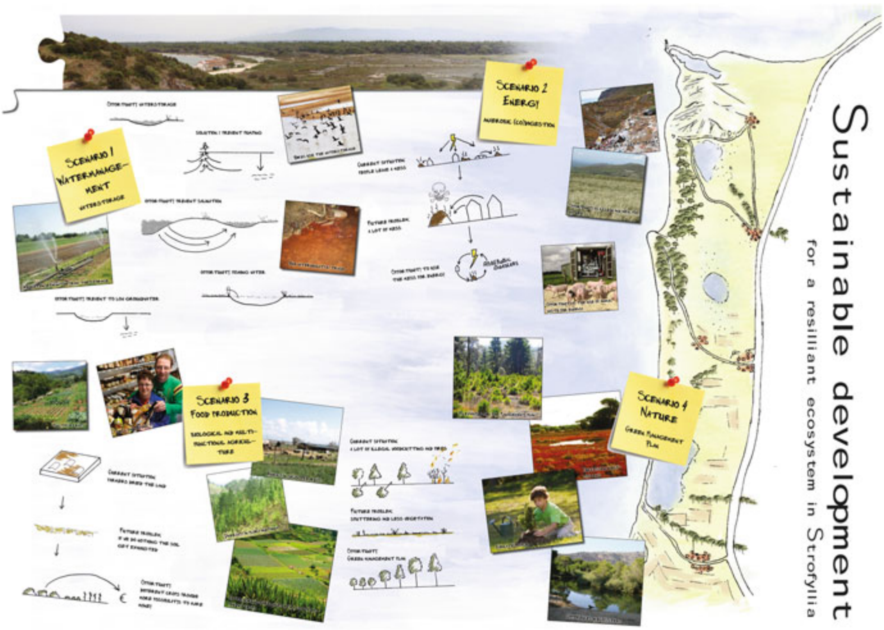

Fig. 11.4 Poster of the Cradle-to-Cradle group

and education for children. This vision of a sustainable future on the horizon leaves the viewer feeling optimistic. Then the Climate Change group presented a detailed list of problems and solutions for the forests and wetlands, proposing opportunities in terms of information and education. The Cradle-to-Cradle group focuses on sustainability and self-sufficiency, coming up with ways of incorporating farming and other human activities in the circle of nature and connecting the natural area of Strofylia with the nearby city of Patras (Fig. 11.4).

The Tourism group wants to put Strofylia on the map by drawing on an old Greek mythology of Hercules who performed many of his heroic acts, the so-called 12 labours of Hercules, in the triangle marked by Delphi, Olympia and Patras, thus connecting Strofylia with Delphi and Olympia in a touristic arrangement.

11.5.2 Lessons Learned

Lessons learned by students and teaching staff (Branderhorst 2012):

1. Students and Staff were confronted with problems and conflicting interests in the field. For example, the farmer says he doesn't use heavy-duty pesticides but Staff of the Management Body says toxic pesticides have polluted the water in the wetlands.

2. They experience different government attitudes in Europe. For example, in the Netherlands a lot of effort is directed on making a profit from nature development. This is not allowed in Greece, as law prohibits making a profit exploiting nature. Fishermen, farmers and tourists all have to pay but that money goes to the government rather than being spent on managing the area.
3. Broad educated students Management and Landscape Architecture have worked with specialist students Chemistry, Biology and Agro-engineering, all from different national backgrounds, as Albania, Greece, Spain and The Netherlands. Students and staff faced a wide range of different disciplinary and cultural discourses.
4. The open teaching method delivers results, which can be just as new for the teaching staff as for the students themselves.

Lessons learned by Strofylia stakeholders:

- The students have given a direction in which to take a regional Strofylia vision of the future and showed how to change problems into challenges and solutions according the director of the Development Enterprise of Achaia-Western Greece Region (NEA), Kostas Giotopoulos. He emphasizes that his organization needs an integrated approach. “Young people see things differently and give a new perspective. We see the complications along the way; they see the goal at the end.”

11.6 High-Pressure Atelier Lugo: Urban Agriculture and Local Food

Thirty Spanish and Dutch students spent a week studying the options for urban agriculture in the Spanish city of Lugo in Galicia. Lugo has 98,000 residents, most of which work in the public sector, services or the food processing industry. In the past, the inhabitants of Lugo obtained most of their food from the surrounding area but these days many people do their shopping in the supermarkets. The Lugo people are very well connected to the countryside; there is large amount of green areas very close to the city centre and the economic crisis forces people to a cheaper way of living. The atelier aims to discuss the opportunities for urban agriculture and to develop different scenarios for the future. Again a journalist followed and described the atelier (Branderhorst 2013).

11.6.1 The Lugo Atelier Process

The Lugo Atelier process (Fig. 11.5) started with a field visit of students in four groups to the Lugo market, the allotment gardens, green areas, which are located close to the city centre, a multi-functional farm and policy makers at the

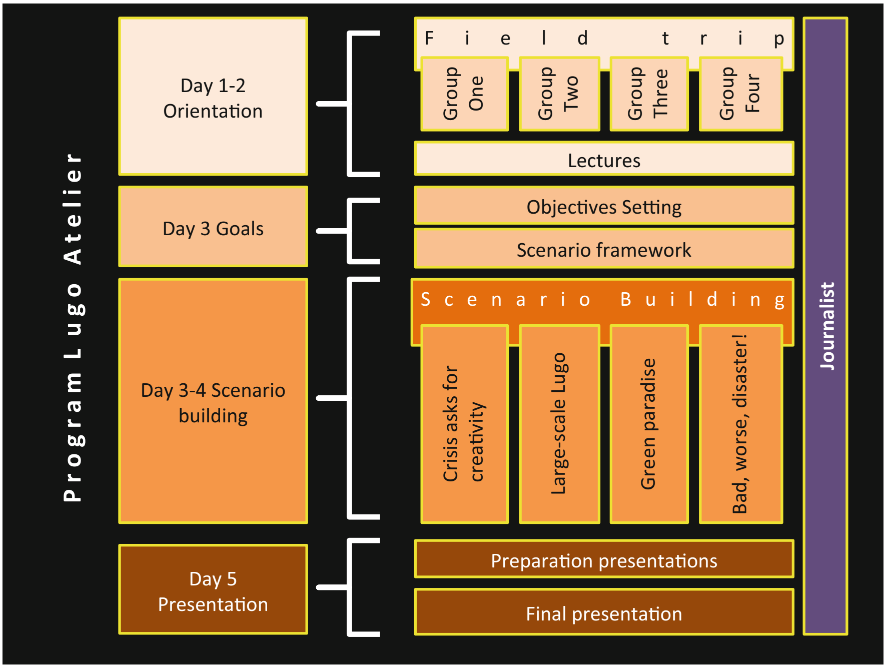

Fig. 11.5 The process in the Lugo Atelier

municipality respectively. They interview stallholders at the market, their customers, the gardeners and people being around in the parks. After these field visits, a full day of lectures is provided on the theoretical background on local food systems and urban agriculture, the global market and the challenges to agriculture, the sustainability aspects of urban agriculture, local food initiatives in the private sector and good governance.

Then the students have to discuss general future developments in Galicia and select the developments they see as most crucial. The lack of awareness about sustainability and food, and the economic crisis were selected. These crucial factors form the two axes of the scenario-building framework. The horizontal axis represents the economy; on the left-hand side the crisis gets worse while on the right-hand side it passes. The vertical axis represents awareness. At the top, people are aware of the importance of sustainability and healthy, locally produced food while at the bottom there is a lack of awareness. The quadrants represent four scenarios, which each will be elaborated in greater detail in one of the groups. Each of the groups has to develop a detailed plan for two areas.

The four scenarios are (Fig. 11.6):

1. 'Crisis asks for creativity'. This scenario assumes the economic situation has worsened while awareness has grown. People have less money so they have to be more inventive. They create an edible green city with fruit trees and roof gardens.

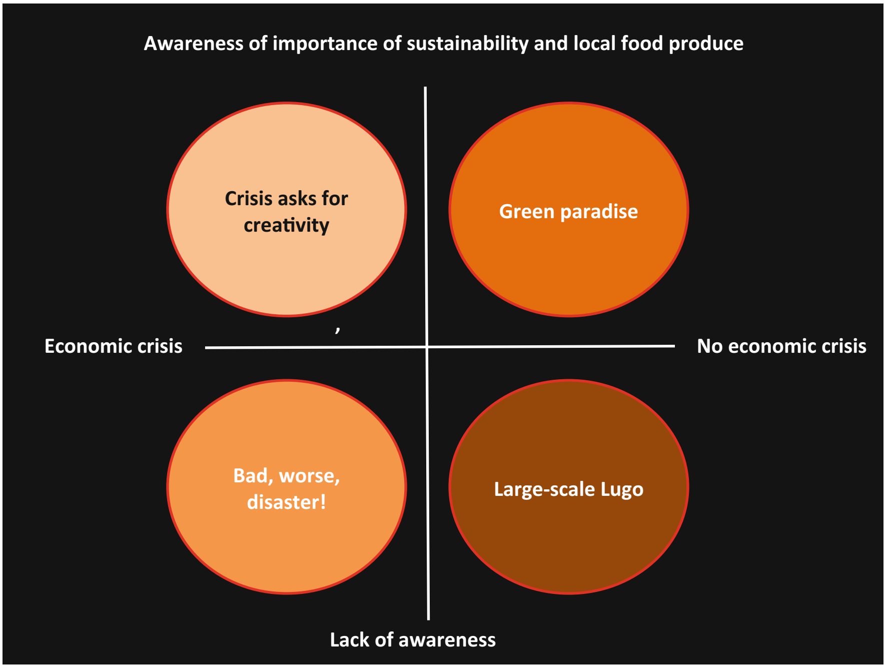

Fig. 11.6 Quadrants illustrating the four scenarios of the working groups (Branderhorst 2013)

Vacant sites are turned into vegetable plots while businesses and supermarkets grow vegetables on the roofs. People who sell their products in the market have to pay a 10 % tax, which the government then invests in public green spaces.

2. 'Large-scale Lugo'. This scenario represents an improved economic climate and lower awareness. The students' prediction is that the city and industrial areas will expand and farming will become more intensive. They also foresee an increase in scale and more trade with the rest of Spain. Because people have more money, they will want to live in more spacious surroundings around the edge of the city. In addition, the pilgrims' route to Santiago de Compostela will be improved.
3. 'Green paradise'. In this scenario the ideal future of a more healthy economy and greater awareness is proposed. Everything is geared to nature and food; the city will get green avenues, orchards, parks, and houses with vegetable gardens and roof gardens. There will be a green belt around the city walls, the route to Santiago de Compostela will become greener and industry will make use of sustainable energy systems. There will also be country houses with large gardens in the surrounding countryside and farms with closed-loop recycling systems. The academics appreciate the links between the city and countryside and the different scales in this scenario.
4. 'Bad, worse, disaster!' (Fig. 11.7). This is the worst-case scenario: with worsened economic conditions and lower awareness. The gap between poor and rich will grow and the rich will take cover behind the security of the ancient city walls.

Fig. 11.7 Bad, worse, disaster! scenario

> The poor will live all around. Slums will appear on the outskirts of the city with vegetable plots, but these will not provide enough food. As a result, people will rely on cheap supermarkets with poor-quality food. The rural areas will see the introduction of polluting intensive farming. There will be no more conservation of nature and the environment, and the woods nearby will be used for fuel.

Finally, the students have to look for similarities between the scenario's and developments that have to be avoided, thus contributing a long list of measures easily to be undertaken.

11.6.2 Lessons Learned

The main lessons learned in the Lugo case study were (Woudstra 2012; Branderhorst 2013):

1. The language barrier was a problem;
2. Students learned about group processes and intercultural cooperation;
3. Students learned about food systems and agriculture;
4. The collaboration and interviews taught students to understand different perspectives and interests;
5. Students developed a good understanding of scenario planning and the various paths that could be taken.

11.7 Conclusion

In both Strofylia and Lugo a journalist, who was around during all formal and informal activities, has described the atelier-process. In Lugo a short questionnaire was used for evaluation by one of the teachers. Several conclusions can be drawn:

1. There is a big difference between the approach in Strofylia and in Lugo. The Strofylia atelier aimed to explore possible future scenarios, because of which a wide range of inspiring lectures were organised during the atelier. After the mid-term presentation three different scenarios as well content and scale issues came up spontaneously. The ambition to 'explore' demands openness during the atelier. On the contrary, the Lugo atelier was very well structured. Two days of comprehensive lectures on the topic by a visiting professor and a well-organised process to choose four different scenarios were directing the students to develop challenging scenarios, which aligned with the agenda of local policy makers. The concrete objective to put a certain issue on the political agenda demands a creative and sharp process.
2. The workshops were beneficial for the students as they experienced for the first time an interdisciplinary international collaboration and developed the required skills. They were familiar with traditional planning methods, and were introduced to alternative methods of planning, focussing on social aspects and methods of developing scenarios. Students stated that in the future they plan to make use of similar approaches. They discovered new perspectives on the topic of the atelier, such as urban agriculture in Lugo. The atelier teaching methods are new for most staff and students. the students found the interdisciplinary collaboration an eye-opener. At the end of the workshop in Strofylia the students presented their findings and ideas to the relevant civil servants, politicians and other stakeholders, who concluded that the students' fresh viewpoint and focus are an unexpected source of inspiration. The students were able to produce scenarios that were realistic and identified key developments. In this sense, the University can play a part in transferring this knowledge to the community and is also in a preferred position to exert pressure on the authorities and administrators to consider upcoming new ideas.

11.8 Discussion

For a thorough understanding of the advantages and shortcomings of the different ateliers more profound research is needed. This chapter started reflecting on cognitive flexibility and creativity. Whether the ateliers contribute to a more cognitive flexibility or creative thinking, cannot be answered with a clear yes or no. Although the statement of the NEA director comparing young students with current staff is clear: "Young people see things differently and give a new perspective. We see the complications along the way; they see the goal at the end." Papers reporting on the two High Pressure Student Ateliers (Branderhorst 2012, 2013) or on other Problem Based Learning workshops also mention these aspects; (Koopman en Elerie 2008), stating that students, as young experts, though with less experience and knowledge have a greater flexibility than very experienced senior experts. However, a simple journalistic description on student ateliers does not provide scientific evidence.

There has not much study been carried out on high-pressure student ateliers in land use planning and landscape architecture. The process of design and more specific collaborative design has been extensively studied in fields like engineering and architecture (Eckert et al. 2003; Detienne 2004, 2006; McDonnell 2009). Lloyd and McDonnell (2009) position design analysis in a wide range of fields. On the one hand there is the continuous plea for quantitative data and evidence, on the other hand design 'is concerned with a complex heterogeneous human activity; and it is concerned with finding practical ways to improve human performance in complex tasks' (Eckert et al. 2003). Each of these characteristics has parallels in other fields, which makes quantitative analysis difficult.

Also further research is required to gain more insights in whether and how high-pressure student ateliers result in improved student skills in cognitive thinking and creativity.

In the EU INTERREG research projects, such as Value + (www.value-landscapes.eu), focusing on integrating bottom up and top down design decisions in urban public space, and Lively Cities (www.lively-cities.eu), looking at place making, Van Hall Larenstein makes use of high-pressure ateliers. These ateliers start in the exploration mode, looking for possible investments in urban public and green space and ending in an evaluating mode, evaluating the investments the projects put forward in public and green space. The differences between exploring and evaluating ateliers need to be further elaborated.

Moreover, conversational exchange through interpretation and analysis need further research, as this is an example of interactive workshops, which are increasingly applied in planning practices to facilitate authentic dialogues (Cilliers et al. 2011). The 'communicative turn' in planning emphasises the importance of a dialogue that enables stakeholders to learn from each other: to listen, react and develop a shared understanding of the problem, possibilities and best available options. Although expectations on the merits of dialogue are high, planning scholars have yet to empirically validate the methods and techniques that facilitate such dialogues. Data derived from the workshops of formerly mentioned projects is required to supplement scientific knowledge on communicative planning. The gap of describing and analysing conversational exchanges and collaborative negotiations (McDonnell 2009) need to be filled through conducting short, structured interviews with citizen participants of the workshops and compare their answers before and after the workshops. In case of larger groups of participants they need to work under deliberately chosen different conditions in order to determine how these conditions affect outcomes.

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Chapter 12
The Charrette of Mr. Xu

Rob Roggema

12.1 Introduction

Let's imagine, in the city of Wan Zhou, in the Western parts of China, another large city is developing at an unimaginable pace. According to the Chinese national governmental planning agency, this prospective metropolis needs to quadruple in size over the next decades. One of the areas the governments had laid its eyes on is Yong-Xin district, some 15 km outside the central city and currently in use as poor agricultural land, farmed by farming families that have lived in the area for thousands of years. Current living circumstances in the area are poor. People eat sided diets and die at relatively young age. The way farming operates in the area emits a high level of carbon due to its predominant use of fossil resources. The area is vulnerable for heat waves, droughts and floods as well as bushfires. The local authorities, in conjunction with a national renowned project developer, have conceived a preliminary design for the area (Fig. 12.1).

In this design a series of high-rise apartment buildings are proposed along with compact residential mid-end low-rise buildings. The number of dwellings proposed is 2,500 and are accompanied with schools, a shopping mall, community centres and offices. This high level program will lead to a complete makeover in the area and this came as a surprise to the current inhabitants. They experienced the propositions as a short-term intervention, changing the area from agricultural to urban, without the notice of long-term change, such as the energy provision, climatic impacts and socio-economic developments. Protests rose amongst the current inhabitants of the area and their powerless position was even used by artist Liu

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Fig. 12.1 Fictitious rendering of the initial design proposal

Fig. 12.2 Reflection of powerlessness: the 'Invisible Man' by Liu Bolin (http://factsanddetails.com/china.php?itemid=1158)

Bolin in his work 'Invisible Man' (Fig. 12.2). This was the reason for Mr. Xu to step up and ask for an adjusted design process in which more space was incorporated for collaborative future visioning, which explores the longer-term desires of the current and future community. The developer, after deliberations with the National government and local authorities, proposed to organise a design charrette, a way of designing a sustainable future for the area together with a larger group of stakeholders. Mr. Xu and his fellow community members were wary at first, but soon they understood the advantages.

12.2 Dynamism

Mr. Xu became the leader of the design charrette very quickly. This happened not only because the government and developer didn't want to organise the design charrette, but they saw as the best first step in this collaborative process to hand over the responsibility to the most involved, in this case Mr. Xu and his fellow community members and collaborators (the fictive 'Team Xu[1]'). Handing over the responsibility does not mean the developer and the government withdraw from the process, but they stay committed and they support Team Xu financially, with expertise and with their own active participation.

The world Mr. Xu has entered is a complex one. There are many different interests and a wide range of stakeholders he has to take into account. The developers interests, the ones of the government, both the local as national and there may be a lot of different departments involved. Then there are his followers, which all have different insights, wishes and also capabilities to contribute to the design process. Some of them just want to continue farming, other have the dream of starting their own businesses and others are looking for improved living conditions and fancy a new clean and modern house. There's also the change in demands. It seems to be quite clear what kind of functions and how many of which are planned for the area, but due to changing policies, regulations, new political appointments and changed views the programmatic filling can change over time. This implies a continuous adjustment in the scope, participants and working methods within the project. Finally, climatic change, risk at natural disasters and global change in the field of the economy and energy supply, impact the propositions for the development site. All these aspects are interconnected and the environment Mr. Xu finds himself back is a world of dynamism.

According to Wikipedia, which may or may not be fully trustworthy, dynamism is defined in different ways. From a philosophical point of view *dynamism* embraces cultural change, individual choice, and the open society. It is a forward-looking and change-seeking philosophy that generally favours unregulated organisation through "spontaneous order" (Postrel 1998). Dynamism is also used in computing where it refers to any process in a computer using dynamic management methods to give more user friendly work that are more easy to interact and modify. Furthermore, *Plastic dynamism* is used by the Italian futurist art movement to describe an object's motion, both intrinsic and relative to its environment. And finally, dynamism describes the activeness of an energetic personality.

These characteristics describe also the atmosphere and methodology used in design charrettes. The aim for (cultural) change, in which individual choices in an open context determine change seeking visioning of the future create during the design charrettes a spontaneous order. The methodology is user friendly, offers

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[1] Team Xu consists of Mr Xu, fellow community members, representatives from government and the developer and academic experts in the field of design, planning, organisation of charrettes and sustainability.

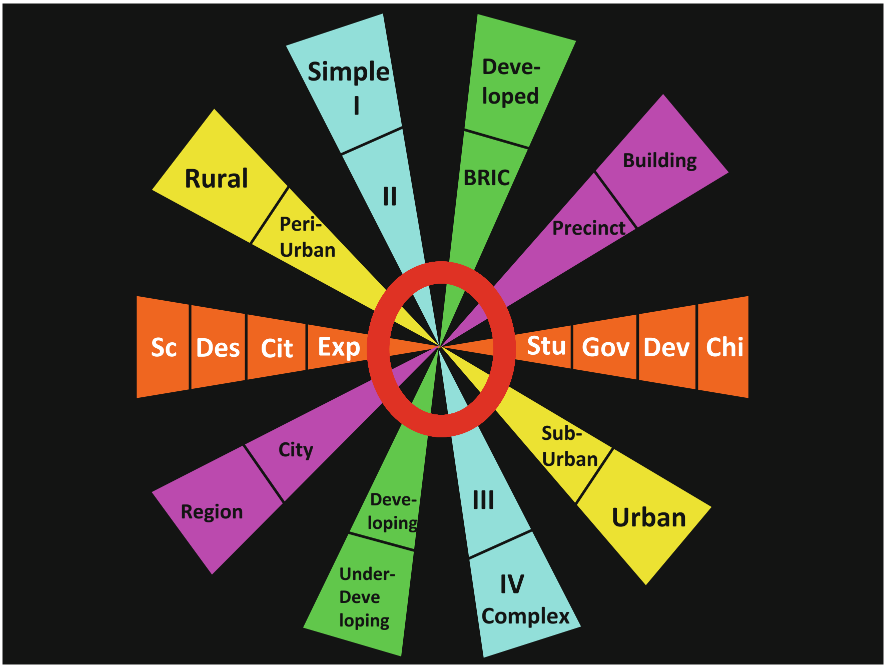

Fig. 12.3 The charrette wheel

space to interact and has the flexibility to modify both content and program. Literally the object of design, e.g. the site, is in motion, both in terms of changing designs proposed for the site as the perception of participants about their future desires and design directions for the site. The design charrette atmosphere is important to reach results and needs therefore to be led by an energetic personality. The design charrette comprises a dynamic planning and design process (Condon 2008; Lennertz and Lutzenhiser 2006). It starts with the preparation (Sect. 12.4), followed by the first charrette 'Scanning the Future' (Sect. 12.5), the Appraisal (Sect. 12.6), the implementation charrette (Sect. 12.7) and finishes with the reporting (Sect. 12.8).

12.3 Point of Departure

The first step Team Xu undertook was to use the charrette wheel (Fig. 12.3) as a point of departure to identify and frame the project they needed to undertake. The wheel gives insights in all dimensions of a potential design charrette. Team Xu determined the project to be:

- Located in a BRIC country;
- A complex problem and assignment, because of the integrated, long-term character and the wicked climate and sustainability issues;

- On the precinct and building level;
- Rural, peri-urban and suburban in typology; and
- A project in which governments, developers, local experts, academics, citizens and students are the major stakeholders.

Learning

The Charrette Wheel can be used to determine the framing of the design charrette, determining the location, scale, landscape, complexity and participants of the design process.

12.4 Preparation

In the preparation phase everything that is required to hold a successful design charrette is taken care of. The relevant data and maps are collected or constructed; the network of participants and stakeholders is build and the support from council or decision-makers is gained; the design brief is written; the program is developed and all practical requirements are arranged.

12.4.1 Support

Mr. Xu and his team were given the responsibility for the design process, but his didn't mean they wouldn't have to gain support for the way they executed it. Therefore, Mr. Xu visited both the local and national authorities and the developer to gain support for his idea to organise a design charrette. He started at the top. The Ministerial representatives were keen to hear about his creative approach in designing a future for this highly contested area in Wan Zhou. The innovative way of collaborative design opened up their interest, but more so they estimated the complexity of the assignment to design a sustainable future for a site, which is under programmatic pressure and faces serious climate hazards, such as potential floods and bushfires. At the Ministry of Housing Mr. Xu arranged support for the design charrette from the Minister of Planning in an indirect, but significant way and allowing Ministerial representatives to participate in the design charrette. This gave him the confidence to start negotiating with the local authorities. He arranged a meeting with the CEO and two of his closest employees. They discussed the benefits of a design charrette and he pointed out that this charrette helps to solve the complicated and tense planning problem for the site. Also, it helps to get inhabitants behind the development and all happening in a pleasant and mediational manner. The concerns of the local government mainly consisted of the time required for the charrette. They assumed that a 3 day leave from the office would be too much for many of the local officials. They agreed on organising a design charrette, which lasts two and a half day, at the most. The developer, the following institution Mr. Xu contacted, saw the benefits of the design charrette in several aspects. Firstly, it enabled him to get valuable design propositions for a low price. Secondly, the developer estimated that while running the design charrette, the goodwill in the community could be improved and finally, he is served at getting design solutions for an awkward and complex planning assignment. Returning to his team, Mr. Xu could confirm the high-level support from national and local governments and the developer for a process of interactive design for a sustainable future. These high level commitments underpin the interest and participation of crucial institutions for the sustainable development of the area and it also shows other parts of their organisations the importance of becoming a member and a participant in the design charrette. It means also that Mr. Xu is backed by these institutions and that he can proceed with the preparations with confidence.

Support in local authorities needs to be found at the higher level, in order to set the example for the rest of the organisation. It helps to have support from the National government too and also from the institution developing the area. These three institutions are the ones that have a legislative and financial say in the future development of the area and can therefore choose for a certain direction. Often a local council is busy with its own planning, procedures and projects. The way council operates does often leave not enough room for innovative and collaborative design processes. Officers are often becoming supportive only after a design charrette has taken place, mostly not beforehand. It is essential that the design charrette is linked with a current urban development, planning or design problem to give reason to conduct the charrette, because it then can deliver design solutions, strategies and measures that are valuable and timely in actual planning processes.

Learning

Support from the local and high-level decision-makers is required to gain enough backing for the collaborative design process, while it is recommended to seek support at State or National levels and with developers to gain momentum as well.

There must be a logical and clear reason to conduct a design charrette. It needs to deliver the design answers to questions posed in actual planning processes.

12.4.2 Design Brief

During his conversations with the decision-makers in government and developer Mr. Xu identified the first core issues for the design assignment. He explored the current project environment, the wishes and constraints of these decision-makers and current planning processes. This information is a good starting point for Mr. Xu to put together the design brief. The design brief functions as the basic document to be used before and during the design charrette. Therefore, the assignment, program, background material, consisting mainly of analytical maps, schemes and graphs, practical information and participants are all part of the brief.

Learning

The design brief is the document in which all information about the site, assignment and practicalities is brought together. It functions as 'home base' for all participants in the design charrette.

12.4.3 Program

One of the conclusions Mr. Xu could draw from his visits is the time constraints of officials. The fact that these people are busy and cannot leave the office for more than 2 days brought Mr. Xu to design a program of one and a half day. This way he prevented participants from having excuses to leave half way the charrette and because the program designed is very concise it increases time-pressure and intensity. This pressure cooker leads to tight schedules, but also to unexpected and interesting results. Mr. Xu and his team decided to fit the program in one afternoon-evening, followed by an entire day.

The basic ingredients of the program in the program-design are:

1. An official opening and welcome. Introduction by the responsible political decision-makers, brief background presentation about the spatial planning context and the main (environmental, climate-related) problems. Short introduction to the program, objectives and expected outcomes by the facilitator;
2. Goal setting. In this part the participants define the benefits and drawbacks of the situation in their area 30 years ago and imagine the same for a future 30 years ahead. By exchanging these experiences and expectations groups define their values and subsequently their desired objectives;
3. Sketch. The second part consists of sketching the objectives in a spatial way on maps. In groups discussion takes places how the objectives can be realised and where functional change, new activities and protection zones need to be projected;
4. Build. The sketches are then used to visualise the future visions in 3D, using plasticine. While literally building the future with their hands, participants will enter a conversation about the real desires for the future rather than exchanging political views and perceptions;
5. Present. The last part of the program is the presentation. Each group will present its future vision for an audience of decision-makers. It is important decision-makers are the audience, because they are asked to reflect on the outcomes and determine the character of the design charrette as an important event.

Learning

A concise, intense program will get the most out of the participants and doesn't comprise their time. The design charrette program consists of, at least, opening, goal setting, sketch, build and present.

12.4.4 Method Selection

In order to have good results, especially during the group work, Mr. Xu and his team needed to select the tools and methods that would offer the best chances for people to step out of their daily routines, open up their minds to future thinking, and to generate ideas. The first conclusion they drew was that any method used needed to frame the assignment and problem in a positive way. Encouraging the participants to think one step further than they think is realistic requires an environment that is stimulating and questioning the participants about their underlying long-term desires. As such, appreciative enquiry theory offers the context to build on the positives for the future. Mr. Xu found in backtracking and back-casting the most suitable methods to use in his design charrette. Especially during the goal setting part these methods are very useful, as they allow participants to identify the sustainability of the past in order to be able to envision a sustainable future, which can be realistically cut in pieces for realisation from the present day.

Learning

Backtracking and back-casting are excellent methods to use in positively framed future visioning exercises.

12.4.5 Pre-creating Maps

The design charrette requires visual information to work with. In Mr. Xu's opinion this meant that he would need to create maps of the site. One map wouldn't be enough, because understanding of all the different facets of the area is better if each aspect is mapped separately. He was very lucky to walk in a couple of students, who were excellent in making these maps. They study urban design and landscape architecture at the Faculty of Design in the University of Wan Zhou and were keen to gain experience in a 'real' working organisation and joined Mr. Xu in developing the maps for the charrette. Different types of maps were made. The first series of maps are analytical, showing how the water-system, the road infrastructure, the energy system, land-use and elevation exactly operate. The students put an effort in making these maps crystal clear and beautiful. The second series are working maps, which are used during the charrette to work on. These maps are different in scale and show the integrated current situation of the entire site, specific parts and detailed locations. They are used to sketch on or function as the basic layer to overlay with butchers paper and draw on, and form the basis for the plasticine modelling. These maps are printed in large sizes (A0) to make a collaborative sketch session, around the table, possible. Black and white prints are sufficient for this use. Besides the maps, schemes and graphs are developed as well. Some of these give insights in the historic developments in climate impacts, or explain demographic or economic data.

Learning

It is extremely important to have access to a broad pallet of analytical maps, showing how different functions operate on-site and large size working maps in different scales.

12.4.6 Participants

In his discussions with government and the developer Mr. Xu could create a list of crucial participants. This initial list consisted of the usual suspects: officials from the most relevant departments, such as planning, environment, community, representatives of the developers' planning agency and community groups, such as the local group for sustainability, the joint group for more local food, the ecological working group and the cultural heritage working group, and also Mr. Xu's local community group. After some intense discussions with people who know the local context well, Mr. Xu could add a number of extra people to his list. These people, the strategic key-players in a community, the charismatic group-thinkers and the specific local experts in the field, usually not represent a certain group or department, but are the local heroes bringing in the most valuable ideas. The last group of people Mr. Xu adds to his list are the researchers and designers. The researchers, climate scientists, economic scientists and social scientists add valuable scientific knowledge to the table. The designers are recruited from the university as well as from design consultancies. In addition to this group, university students from the faculties of architecture and design, environmental management, energy-systems and climate studies were invited to participate.

Finally, Mr. Xu came to the idea to invite children from the primary schools in the surroundings of the development site. His thoughts were that these children are the ones that will actually be living in the future that will be designed during the charrette and generally these kids are not invited to take part in any discussion determining their future. He approached the principles of the two schools nearby and received a very supportive response. Both principals were happy to recruit a group of students who take part in the design charrette. He knew this was an experiment, but had strong belief that these kids could add something special to the event.

It is important to select the right ‘mix’ of people to participate. An overload of academics or designers doesn’t support a creative exchange of ideas. Ideally, the charrette participants consist of a combination of scientists, local experts and stakeholders, decision makers and knowledge brokers, designers and technical experts. The right mix of people causes the desired dynamism in the event. A total number of 30–40 participants are best for a charrette: it guarantees diversity, several design teams and stays manageable. To involve 10–15 children in their charrette is ideal. In order to commit people to participate it is important to communicate the impact they can have on the future with their participation and to clarify the significance decision-makers attach to the outcomes of the charrette. Further, it helps to create a charrette, which is as short and convenient as possible and to approach the crucial potential participants personally beforehand.

Learning

The participants should consist of a wide variety of people, both recruited locally as well as externally. A special feature to consider is to involve primary school children.

12.4.7 Materials

Mr. Xu went shopping. He needed to buy the materials that would be used during the charrette. He visited two shops, the stationary shop and the art shop. In both shops he succeeded to buy the materials he wanted. He bought ten boxes of plasticine, ten sets of coloured pencils and ten sets of coloured markers, five roles of butchers paper in different sizes, tape and five sets of cutting knives. After the art shop he visited the copy shop to copy the assignment cards on coloured paper and to have them sealed. Here, he also arranged for the large sized working maps to be printed in black and white. After his shopping he went home with his ‘charrette’ (cart), full of promising stuff.

Learning

The material needed to run a charrette needs all be available from the beginning. There must be no shortage of any material during the charrette.

Fig. 12.4 The *Eemshotel*, venue for the Coastal design charrette in Groningen, the Netherlands (http://mw2.google.com/mw-panoramio/photos/medium/74067189.jpg)

12.4.8 Venue

Mr. Xu deliberated with his team where to hold the design charrette. They finally came to the conclusion that the venue needed to be special, but also located near the site. There was a lovely old teahouse available, close to the river, which offered several spacious rooms for both plenary and break-out groups. The location adds to the atmosphere Mr. Xu tries to achieve: it must be a pleasant place to be for one and a halve day, have some views over the development site and some space to "lean back". Additionally, Mr. Xu thought that an intensive working event couldn't do with the necessary food and drinks. Therefore, he arranged a local caterer to provide locally produced food and drinks for lunch and a joined dinner.

Atmosphere is important. When discussing the ways to defend the coast against storm surges it is inspirational to do so in the hotel that stands in the sea, overlooking the water (Fig. 12.4).

Learning

The venue determines the atmosphere of the charrette. It must have space for each of the charrette steps, be close to the site and be inviting to share lunches and dinner.

Mr. Xu was satisfied with all his preparations. He managed to involve important stakeholders, populated the design brief with challenging assignments, the design charrette program and maps, and he arranged all the practical requirements. Finally, perhaps the most important he invited and secured participants with a variety of backgrounds, experiences and skills. Let the charrette begin!

12.5 Scanning the Future

With great excitement Mr. Xu and his team were awaiting the first design charrette, 'Scanning the Future', to happen. They thought of everything, but still, they were uncertain how things would unfold. Early morning they arrived at the venue, the old teahouse (Fig. 12.5), which is located next to the site. All the materials were there and they started to prepare the rooms, dividing the maps and tools over the design group tables and arranged the set-up for the opening ceremony.

The first design charrette, 'Scanning the Future', aims to identify positive, tangible and broad pallet of design solutions for a wide range of sustainability topics that are relevant to the site development. This charrette is divergent of character and focuses through group work on different scales, topics and areas. It needs to deliver robust solutions that can deal with the many uncertainties that are part of the assignment for the proposed urban development. This results in a broad range of design scenarios and models, each with its own merits.

12.5.1 The Opening Event

The design charrette starts with an opening ceremony. The ceremony started at 1.30 p.m. after a modest, shared lunch. Many stakeholders and participants attended the ceremony (Fig. 12.6) and several introductory speeches were given.

Mr. Xu was very pleased that the vice Minister attended the opening ceremony to officially welcome the guests (Fig. 12.7). The fact that such an important person makes the effort to address the importance of the upcoming 2 days to the participants gives the design charrette the weight it deserves. In his address the Vice Minister pointed out that for a thorough sustainable urban development on the site the contributions and expertise of all participants is valuable. He articulated the objective of this design charrette, being to develop a range of design propositions for the sustainable development of the site. He officially opened the charrette and pointed out to look forward to the final presentations of the results, expecting these to be inspirational and 'mind-boggling'.

The second speech was held by the director of the developer. After welcoming all participants and pointing out the importance of the event, he presented the preliminary plan, as it has been designed by one of the large overseas design consultancies. The background analyses of ecological values, water management, energy provision, traffic concepts and the building program, were all revealed and

Fig. 12.5 The old teahouse, venue of Mr. Xu's design charrette (http://www.theoldteahousegallery.com/photo_gallery/)

Fig. 12.6 Fictitious stakeholders attending the opening ceremony (http://www.itfnet.org/v1/2012/04/workshop-on-enhancing-tropical-fruit-markets-held-in-china/)

Fig. 12.7 The Vice Minister gives his fictitious 'official opening speech' of Mr. Xu's design charrette (http://www.who.int/gard/news_events/news/GARD_Launch_Beijing/en/index.html)

Fig. 12.8 The director of the developer delivers his fictitious 'official address' (http://english.iee.cas.cn/ns/aa/200908/t20090805_27108.html)

gave the participants the basic information to build on. He also shared the ambition expressed through the design, which emphasised the modernity of the development and the economic benefits of the transformation. Despite the fact he used the word 'sustainability' very often the participants questioned him after his speech regarding the real achievements the design realises. His response to these questions was that the developer is open to any suggestion from the design charrette to increase the sustainability level of the design and he promised to implement the proposed measures in the next design phase. Finally, he confirmed the participation of several of his highest ranked employees and the project leaders of the overseas consultancy (Fig. 12.8).

The third speech of the opening ceremony was given by the Mayor of the council of which the development site is part. He expressed his gratitude that so many experts and stakeholders committed to participate in the design charrette and especially thanked Mr. Xu for all his preparation work in anticipation of this event. Further, he highlighted councils ambitions and objectives, especially related to sustainability, design and urban development. He also pointed out some of the constraints local decision-making has to deal with. Current political determined policies and the spatial planning regulations are seen as obstacles rather than provisions. He declared as his personal ambition to create a new precinct, which meets the highest sustainability standards, takes shape in the form of a ground-breaking design and creates an environment for its inhabitants where they feel well and are prosperous. He wished all the participators the best of luck and much creativity during the upcoming 2 days of intensive design work.

After the Mayor has spoken, it was Mr. Xu's turn. In his speech Mr. Xu showed his gratefulness for the support of government and developer to organise this charrette and moreover, their promise to implement the results. He also spoke about his fear, and that of many in the community that this urban development would vanish their history, their environment and their lives. His greatest anxiety was, what he called a 'doomsday scenario', in which the urban development took over the agenda

Fig. 12.9 The way the new development shouldn't be, according to Mr. Xu: a modern ghost town (http://www.time.com/time/photogallery/0,29307,1975397,00.html)

and just progressed, without any reality checks whether this development is wanted and whether people actually would start living there. He warned for the development of a modern ghost town (Fig. 12.9), a precinct that is designed in great detail, according the latest insights of urban design, and having everything in place, except for the people to live in this 'phantasy'. Mr. Xu expressed his hope that this design charrette would prevent such a development from happening, and that the joint design capacity would provide for a liveable and sustainable new precinct.

The last person to address the audience was the facilitator, who explained the objectives and the program of the design charrette, but also emphasises the intensity of the event. The fact to gather in such a beautiful old teahouse, away from the office, allows people to focus and concentrate on the design work and the assignment at hand. This, she said, is an extraordinary occasion, which will not occur every week. Therefore, she encouraged each participant to enjoy the process, the company and the design work.

At 3.30 p.m. the official opening ceremony was finished and Mr. Xu felt very happy all went well. He received many compliments about the opening and the

Fig. 12.10 Fictitious group picture of design charrette participants together with decision-makers (Roggema and Boneschansker 2010)

atmosphere he created. However, he knew the real work still needed to start. At the end of the opening ceremony everyone went outside for the group picture (Fig. 12.10) to be taken. A great moment, because the participants of the charrette and the honourable guest and decision-makers were brought together, they mingled and smiled for the picture. Ending the opening session in this way reinforced the collaborative character of the design charrette. People with different perspectives and interests are part of the same shared occasion.

Learning

An official opening ceremony creates an atmosphere in which the design work is qualified as being important. It is preferable to invite high-positioned representatives from different angles to address the audience and at the same time provide background information in a concise way.

12.5.2 Site Tour

The rest of the afternoon is reserved for a site visit (Fig. 12.11). All the participants went on foot to take a look at the site. Mr. Xu arranged a local expert to guide the group through the site and explain its qualities and features. Everyone could have a look around the site, take a lot of pictures and discuss their first ideas and problems on the spot. They get a feeling for the environment, the history of the site and the general atmosphere. They could also learn the basic ecological system and the functioning of the water system, both seen as fundamental; layers to develop a sustainable future. Finally, the designers of the preliminary plan had the opportunity to explain their ideas about how their design fits into the site. A lively debate immediately emerged.

After the site visit the participants enjoyed a joint dinner in the old teahouse, where the caterer provided a rich, locally produced, dish.

Fig. 12.11 Fictitious experts and stakeholders inspecting the development site (Pictures © Ruben Abrahams and Rob Roggema)

Learning

To visit the site with the whole group is important as it gives the opportunity to experience the location 'real time', understand the systems, challenges and opportunities, to start discussions and, as a group, build up a joint experience and perspective.

12.5.3 The Design Stages

Mr. Xu designed his charrette program in a way to have three consecutive design sessions, each with different objectives and tools.

The first night is meant to identify common objectives and goals. The question asked is what the group wants to achieve in the future. Because it is always difficult to reposition yourself in a future that is still 30 years away, this assignment starts to

Fig. 12.12 The use of post-it notes to generate as much objectives as possible for a desired future (Roggema et al. 2012)

reflect to history and imagine how the site was 30 years ago. Mr. Xu pre-defined the themes to focus on. Because there are four design groups formed, he identified four different themes: land-use and spatial quality, population/people, economy and climate change/sustainability. The groups take one theme each and brainstorm for 10 min to produce as many aspects, put on post-it notes (Fig. 12.12), how the chosen theme appeared 30 years ago. After 10 min, the groups rotate to the next theme, trying to add as many aspects they can think of. After four rotations each theme is populate by all groups and the last group is asked to present the top five aspects of their theme. Once the understanding of the situation 30 years ago is gained, the second part of this exercise is to project, identifying as many aspects as possible on post-it notes, the desired situation for each of the themes for 30 years ahead. The same rotations allow for populating each of the themes again and at the end the groups are asked to present their three main objectives to achieve for their theme. The four themes each have three main objectives, which give a broad overview of the desired future the group wants to achieve for the site. These objectives are taken to the next morning, when they need to be drawn on the maps. Everyone is exhausted after a long and intensive day, and deserves a good night sleep.

The next morning participants wake up differently. Mr. Xu doesn't know exactly how, but people are 'ready for take-off'. During the night people digested the first day, with all the impressions, discussions and first design ideas. It was also a day of taking in a lot of information, listening and reflecting. This morning, they are challenged to come up with sketches and designs that illustrate how their future must look like. What happens exactly overnight is food for psychologists, but the transformation Mr. Xu witnesses is evident. The morning exercise asks from the four design groups to materialise the objectives of the former evening into concrete

Fig. 12.13 Sketching future scenarios for the site (Roggema et al. 2012)

spatial designs, represented on the large maps of the site (Fig. 12.13). The first part of the sketching is thematic. Groups focus on the water and ecological system, the energy provision, the urban plan/design and the traffic system, all taking into account the entire site. After 45 min of sketching the results are presented and shared, after which the groups are mixed up. Mr. Xu found this necessary I order to prevent groups from 'digging in' on their findings and only digging deeper, but also to be able to integrate the different thematic designs. In the second part of the design exercise two of the groups are asked to focus on the entire site, which is a huge area, and the other two groups to focus on a specific location within the site. The discussions in the groups reach an electrifying level, sparking arguments and opinions, but Mr. Xu makes sure the debates are not overheated by bringing discussions back to the ground level of drawing propositions on the maps. This helps people to tailor their opinions to the site requirements and find common grounds. It is remarkable that forcing group members to draw their vision on the map, the differences between them vanish and a joint design emerges. The morning design session ends around 11 a.m. The results are not presented at this stage, but taken along to the second design session.

This second design session starts at the end of the morning and runs through to early afternoon. The goal of the second exercise is to add the third dimension to the designs through a plasticine modelling process (Fig. 12.14). Mr. Xu distributed four cans of coloured material, which can be shaped in any desirable form, combined into hybrid elements and brought together in 3-D on a basic map. At first, the group members are laughing about the childish plasticine, they are asked to build their models with. However, soon the first people start touching their base material and cut a bit off to shape a first form. Not long after, the first roads, and train-lines, appear on the map, along with green ecological corridors and ponds.

Fig. 12.14 Working with plasticine (Roggema et al. 2011)

Little bikes, trains and buses are added and residential buildings take shape. During this process of modelling the plasticine a constant discussion is going on in the group. Questions ask why this strange orange thing appears here, what is it in the first place and why is there a bike lane here and not there? The constant questioning of each other's assumptions, while modelling new elements and add them to the map sharpens the vision and reasons why this is the future desired by the design group. After 2 h of claying away, four colourful future visions appear on the tables.

One of the interesting results in Mr. Xu's site was the proposition of a good functioning urban agriculture. In the middle of urban developments, this system produces local food and sells it at different places in the neighbourhood. This example illustrates the idea forming and future visioning process when local expert, inhabitants and community members are involved. It is highly unlikely for a large developer to come up with this idea, but because many farmers are part of the design community, the role and physical space to facilitate a new form of agriculture including the distribution and market system to deliver the products, wouldn't have been developed.

In this phase of the design charrette the conceptualisation and manifestation of designs takes shape. It is a series of consecutive iterative phases of conceptualisation, drawing alternatives and refining the vision. Or, in other words: 'talk—doodle—draw' (Condon 2008).

Learning

The design phase is the most important part for developing the future visions. It is important to use different methods and tools during the consecutive steps: brainstorming with post-its, 2-D sketching and 3-D modelling.

12.5.4 Final Presentations

Late in the afternoon the groups present their final results. At first the plasticine models are shared amongst the groups. With all grouped around the table on which the 3-D model is built, each group shares their vision with the others (Fig. 12.15). Mr. Xu is surprised by the wide variety of ideas and the depth of the future visions. Each group had its own take on the assignment, but the communality in the designs is they all make a strong case for local resilience and autonomous resource use and supply. Many of the design propositions took the ecological and water system as the basis to start their argumentation en designs. They created more space for ecological structures, surface water and water sensible design measures in the household and urban design context. This robust blue-green system reduces the vulnerability of ecological and water functions themselves, but it also increases the resilience of the entire area, because a more robust natural system is better capable of dealing with external shocks hence better prepared to bounce back. These robust structures subsequently allow other moderate intensive functions, such as urban agriculture, natural water treatment and residential neighbourhoods to fill the spaces in between. The more intense functions, the road network and industrial activities are located at the outside edges of the site. These conceptual propositions remind Mr. Xu of the concept called the 'Strategy of the Two Networks', developed in the Netherlands and suggesting to separate the high- and low-intense functions in an area to become more sustainable and resilient (Tjallingii 1995, 2000; Timmermans et al. 2002; Aalbers and Jonkhof 2003).

Fig. 12.15 Informal group presentation of plasticine models (Roggema et al. 2011)

After these informal presentations of the plasticine models the design teams started to prepare their final presentations. Each group prepared a power-point presentation (Fig. 12.16) of 10 min to be presented at the public event that terminated the design charrette. These presentations consisted of the analyses, the goals, sketches and 3-D models that were produced during the charrette, explaining what a future vision for the development site might look like. A panel of decision-makers, representing the developer, and the governments then reflected on the proposed visions (Fig. 12.17). Their comments were extremely positive and supportive. They were impressed by the quality and the broadness of the developed visions and saw them as a good starting point to adjust the preliminary design for the site. They jointly concluded that the ingredients resulting from this design charrette can form the basis for a renewed plan for the site, in which the sustainable system forms a much bigger component than shown in the preliminary plan. They suggested to mingle the different strategies and measures from each off the four groups and to identify a way to implement integrated sustainable measures. This suggestion forms a great step up to the second charrette in which Mr. Xu planned to integrate the findings of the first charrette into measures that can be implemented, starting on the short term. Mr. Xu was very satisfied with the comments and the results of the charrette, in which he saw the benefits of organising this on the way to achieving a plan supported by the community and based on sustainability principles.

After the final presentations Mr. Xu had arranged to distribute the presents he bought beforehand. The stakeholders, experts, government and developer representatives all received this special attention: a small mill (Fig. 12.18), made from local clay material, harvested at the site, and glazed in a hot oven.

Fig. 12.16 General presentation for the public (Picture © Ruben Abrahams)

Fig. 12.17 Presentation for decision-makers http://www.stadsbyggnad.lth.se/english/news/

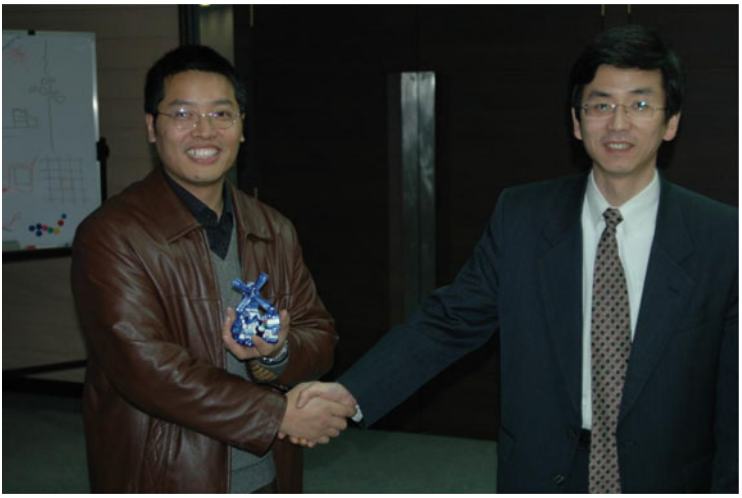

Fig. 12.18 The first present being handed out (Picture © Rob Roggema)

Learning

The final presentation shows the results of the charrette. It is important to present future visions to the other groups as well as to the general public and a decision-makers panel.

12.6 Appraisal

After ‘Scanning the Future’, Mr. Xu wanted to have more accurate information about the different design propositions, made in each of the design teams. Therefore he organised, immediately after the final presentation session a brief evaluation exercise. Each participant and attendee of the final presentation session was given six post it notes of which three represented good sustainability and the other three bad sustainability. Everyone was asked to place these six notes on the elements they thought were the best and worst examples of a sustainable future (Fig. 12.19) spread over the four plasticine models. This quick exercise gives a first impression about where the proposed measures meet sustainability goals and where they don’t. After these first insights were harvested, the appraisal experts started to work on more detailed assessments, including scores for the different aspects of the four visions on economic, social and ecological metrics. The outcomes of this deeper understanding of the sustainability level of these models formed the input for a second design charrette.

Fig. 12.19 Appraising the Good and the Bad in the plasticine models (Clune and Hunter 2012; Clune 2012)

The results from the first design charrette represent a broad spectrum of possible solutions. To gain some insights about their sustainability level they must be appraised on social, ecological and economic factors. The maps produced during the design charrette need to be redrawn in order to serve as basis for appraisal in combination with pictures of the plasticine models. Together this information is rigorous enough for execution of a rough appraisal (Clune and Hunter 2011; Clune 2012).

Learning

The type of results from a charrette allow for a rough, qualitative appraisal, which is conducted by experts, and based on the first estimates provided by participants immediately after the design charrette.

12.7 Robust Land-Use

In the second charrette, Mr. Xu wanted to become as concrete as possible. He needed to get back to the decision-makers after this charrette with a concrete list of measures how the original preliminary plan can be improved in a way the local community would support it. Sustainability was his mechanism to reach his ambition, but he needed to be careful in timing the right measures at their right pace. He thought it didn't make sense to propose realising measures that could prove useless over a longer period of time and re-discussing measures the decision-makers just had adopted didn't make sense either. Therefore he called the second charrette 'Robust Land-Use': to realise sustainability measures that would last a long time, at the right time. The objective for this second charrette was to integrate the ideas and visions into comprehensive design propositions, which are subdivided according their expected realisation term: 'near future interventions', 'no-regret' and 'strategic waiting'.

The second charrette lasted for only 1 day and consisted of three concise and specific assignments. Mr. Xu and his team prepared four maps, one for each of the future visions that were developed during the first charrette. These maps were used to identify the different types of spatial measures. In this second charrette a selection of people that participated in the first charrette were invited. Community, local government and developer, along with local experts formed a group of 15 people, taking on the challenge to move from phantasy to reality. The four maps were used in two groups to create three new maps, one for each of the categories defined before.

The implementation charrette, or 'Robust Land-Use' aims to develop a shared understanding of the desired future and what is required for realisation. It also addresses barriers to change that currently exist in many governmental organisations, the so-called 'window-of-no'. This 'window' prevents change from happening and is often well established through unwritten codes and invisible agreements within the organisation. The implementation charrette is a powerful tool to go past this 'window of no'. The process involves stakeholders in a powerful and integrative way. To connect participants, who in their regular work are probably not connected helps to embed the solutions brought up in the charrette process, which may help to outpace the approval processes, which sometimes can take years.

The results of the appraisal inform the second charrette. This charrette aims to merge the initial results into a set of spatial measures, based on the appraisal and subdivided in three categories, representing different scopes of realisation. In this charrette the teams work collaboratively towards what they commonly believe to be good spatial pathways into the future. This charrette will also deliver a strategy with catalyst projects, being the strategic measures that can be realised first and can play an exemplary role. In a 'robust land-use plan' a commonly felt spatial pathway for the future is developed consisting of these three categories of design measures.

12.7.1 Near-Future Interventions

The first assignment the two groups worked on was to select the spatial plans and measures from the four vision maps that already have been adopted, but are not yet realised. The selected measures and spatial intervention were then brought together on one map: the near-future base map (Fig. 12.20), representing the first category of short term realisable measures.

12.7.2 No-Regret Measures

The second assignment for the two groups was to select those measures from the four vision maps that can be realised and are beneficial in a wide range (or all) possible future scenarios. Realising these measures is literally of no regret. One of the no-regret measures the groups proposed was to decouple the rainwater from the

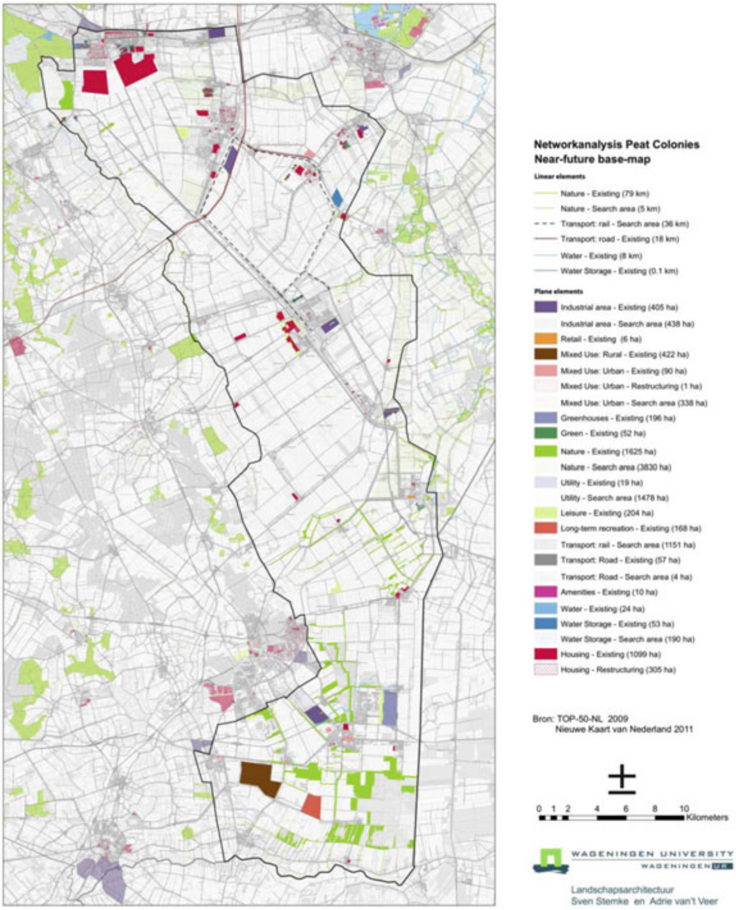

Fig. 12.20 Near future base map for the Peat Colonies (Roggema and Stremke 2012, www.kaart.nieuwekaart.nl)

sewage system. With times expected to become very dry during summer discharging rainwater to the treatment plant is wasting the water, which never returns to the site. Therefore the proposal was to collect the water from the residential parts and store it in the green, forest space located in between the living areas (Fig. 12.21). This water, collected in the wet periods remains in the forest until the dry period when it is led back to the residential areas. This is a measure that is beneficial in many future scenarios. Even if there wouldn't be any dry periods it is a good measure as it decreases pressure on the treatment plant and provides the forest with plenty of water, increasing its ecological value.

Out of this category of no-regret measures 2–3 catalyst projects were selected, as the ones that could be realised first and function as the eye-catchers of good, sustainable design in the development site.

Fig. 12.21 No regret: the 'Buinerhornster Bos' project in Borger-Odoorn (http://www.borger-odoorn.nl/uploads/media/Projectplan_Wijken_voor_Water_2011.pdf)

12.7.3 Strategic Waiting

The third assignment in the second charrette was to identify those areas for which no future function needs to be decided on yet. These areas 'wait' for their future destination and operate in the meantime as the places where the site 'absorbs' unpredicted events and change. For instance, in the residential precinct the design teams proposed a public green space which is used as a park or playground in normal circumstances, but changes in a flood retarding basin in case of heavy rainfall. Or, the other proposal was to identify the old harbour area, located near the river, as strategic waiting space, which remains 'empty' in expectation of a clearer image of how the future is going to develop in the (far) future. Meantime parts of this area can be used to mitigate the impacts of river flooding (Fig. 12.22). All these areas were defined as specific spatial areas on one map: the 'strategic waiting' areas.

Learning

In order to move from phantasy to reality it is recommended to categorise the proposed design measures according their realisation time-frame: very short term (near future measures), short to middle term (no regret measures) and the long term (strategic waiting measures).

Fig. 12.22 Reference image for the space found suitable to mitigate river flood impacts: the NDSM terrain in Amsterdam (http://www.freshville.nl/topic/view/404-mooie-foto-locaties/)

12.8 Reporting

As the last step in the design process Mr. Xu and his team worked on reporting the findings and proposals derived from the preparation, appraisal and two charrettes. Mr. Xu collected all the drawings, pictures of the plasticine models and selected the most important ones to develop into neat and clear computer drawings. These drawings, colourful and easy understandable, formed the basic ingredient for the reports. Mr. Xu proposed a highly visual report, reflecting the work carried out during the charrettes and allowing (parts of) the report to be used in the decision-making process. The report functions as a catalogue, within which the design ideas, from future vision to catalyst projects, are collected. The dominant role of maps in the report is important because the participants of the design charrettes will reflect to the maps as the agreed outcome of the charrettes as the most probable wouldn't to the written text, which in itself is supportive to the images and brief. The final decision the team of Mr. Xu took was to produce a report that literally stands out of

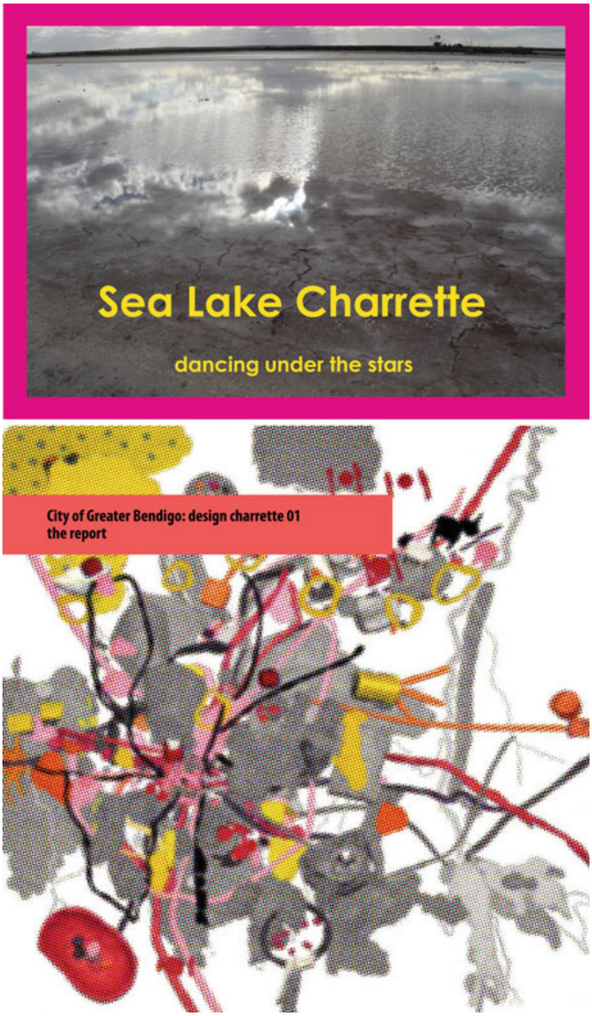

Fig. 12.23 Visual and odd sized covers of the Sea Lake and Bendigo charrettes (Roggema et al. 2011, 2012)

all other reports. The size is different from the standard A4 portrait and it can be odd sized square or landscape oriented (Fig. 12.23).

The final phase of any design charrette reports the results in a visual and clear way. The report functions as the 'contract' for the participants and may be used in formal decision-making processes in different organisations. It needs to be produce in a way that it is possible to extract parts for specific decisions. The report will also function as a 'base of reference' for the longer term and a catalogue for developing new and more detailed projects. Finally, charrette reports will need to reflect on policy development regarding sustainability and spatial planning more in general (Clune et al. 2012).

Learning

To reflect the character of the charrettes, the reports are visual and odd sized, and include all developed material and be able to function as reference base from which (parts) can be extracted for decision-making in different organisations.

After having released the reports, Mr. Xu arranges a couple of meetings with his main stakeholders to evaluate the process, and to make agreements how the findings will become part of the further development of the site. He speaks again with the Ministerial representatives, the local council and the developer. They all agreed the design charrette process was excellent, in the way it was organised, the commitment of the participants and the content of the results. They offered Mr. Xu and his team a cogenerating role in the further development of the site. In concrete this meant a place in the steering committee for Mr. Xu and participation of his team members in further preparation of spatial proposals for the site and the spatial designs for its parts (neighbourhoods, parks, forests, water-system, etcetera). They also committed to use the spatial propositions as the basis for further designs and to use the division of spatial measures and projects in separate categories for developing a realisation strategy. Finally, they all expressed their thankfulness to Mr. Xu for take up the challenge in the first place and the way he has executed the design charrette. They all agreed the site will become much more sustainable thanks to the design charrette process.

12.9 Point of Arrival

At the end of the day, Mr. Xu reflected on the process he went through. He remembers the starting point, when the anger and fear of the community members could be felt everywhere and he could hardly believe there was another way than fighting against the proposed development. Instead, he now feels pride about the change that has happened. Because of the design charrettes, the people in his team and the support of government and developer, the fear and anger has been twisted around and turned into collaboration and sustainability. The design charrette not only provided solutions how to develop the site in a sustainable way, it also brought people together that normally would have seen each other as enemies. The journey of walking, talking, drawing and building together broke down the walls of 'sectoralism', and it gave inspiration to supported and sustainable solutions, as well as a way forward for implementation of projects and measures, for which people feel a shared responsibility. Mr. Xu takes a well-deserved nip of his 'pijo', as he looks at the charrette wheel on the wall. He realises he used every piece of this wheel to commit people, to identify the framing and to create an atmosphere for success. Next time? He would do it again!

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