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Hiroyuki Shimizu · Akito Murayama (Eds.)

Basic and Clinical Environmental Approaches in Landscape Planning

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Aims and Scope

Urban and Landscape Perspectives is a series which aims at nurturing theoretic reflection on the city and the territory and working out and applying methods and techniques for improving our physical and social landscapes.

The main issue in the series is developed around the projectual dimension, with the objective of visualising both the city and the territory from a particular viewpoint, which singles out the territorial dimension as the city's space of communication and negotiation.

The series will face emerging problems that characterise the dynamics of city development, like the new, fresh relations between urban societies and physical space, the right to the city, urban equity, the project for the physical city as a means to reveal civitas, signs of new social cohesiveness, the sense of contemporary public space and the sustainability of urban development.

Concerned with advancing theories on the city, the series resolves to welcome articles that feature a pluralism of disciplinary contributions studying formal and informal practices on the project for the city and seeking conceptual and operative categories capable of understanding and facing the problems inherent in the profound transformations of contemporary urban landscapes.

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Preface: Attaining Sustainability Through Landscape Planning

About This Book

Our societies need to solve difficult issues to attain sustainability. The main challenges include, among others, global warming, demographic change, the energy crisis, and loss of biodiversity. In tackling these issues, a holistic understanding of our living space is important. The field of landscape planning and design is at the core of the holistic concept, and it has provided several contributions to achieving sustainability. First, landscape planning and design connects different spatial scales: from site to region, and to the planet. Second, it focuses on close interrelationships between human activities and nature. Third, it is concerned with people's values regarding their surroundings.

This book is edited based on the presentations made by German and Japanese scholars in the international symposium "New Trend of Landscape Design: Seamless Connection of Landscape Planning and Design from Regional to Site Scales—The Cultural Context" held on November 5, 2012, at the Graduate School of Environmental Studies, Nagoya University. One of the sponsors of the symposium was the Nagoya University Global Center for Excellence Program "From Earth System Science to Basic and Clinical Environmental Studies," an educational and research program that focuses on a clinical environmental approach associated with diagnosis and treatment of actual fields.

From Earth System Science to Basic and Clinical Environmental Studies

Nagoya University, Japan, has been running the Global Center of Excellence (GCOE) Program "From Earth System Science to Basic and Clinical Environmental Studies" funded by the Ministry of Education, Culture, Sports, Science and

Technology from FY2009 (Nagoya University Global Center for Excellence Program 2013). The program is bringing together different disciplines to create an innovative approach to environmental studies. Disciplines such as science are considered to be "diagnostic," in other words, dealing with understanding how the earth–life system interacts with human society. Disciplines such as engineering and agricultural studies are considered to be "treatment-based," meaning that they are concerned with providing technological or regulatory solutions to environmental problems. These disciplines can be reorganized as clinical environmental studies and basic environmental studies.

Our global environment and the diverse earth–life systems contained within it undergo many changes. One approach to these diverse issues is to imagine them to be the equivalent of pathological changes in the human body. This comparison makes it easy to appreciate how the role of environmental studies is very similar to medical science as it confronts disease.

Environmental studies have been split into two distinct fields. One is the diagnostic-type environmental studies, which analyzes the structure of the earth–life interactive system and the relationship between that system and human society. Examples of this type of discipline include earth sciences, ecology, and geography. The other is the treatment-type environmental studies, which seeks to develop technological or systematic solutions specifically designed to deal with—and heal—environmental issues. Disciplines that fall into this category include engineering, agricultural studies, and social studies. The polarization of these two types has resulted in a lack of systematic measures for environmental studies to develop as clinical medicine has. The GCOE program aims to bring the two isolated fields together, allowing us to develop a comprehensive "healthcare program" able to deal with ever increasing environmental problems.

Our GCOE program looks both inside and outside of Japan, covering diverse topics from the diagnosis of illnesses that threaten the sustainability of the relationship between human society and the natural world, to the appropriate prevention and treatment of those illnesses, to the accurate prediction and avoidance of any side effects of treatment. These are systemized into clinical environmental studies. In addition, basic environmental studies are developed to consider pathologies that threaten to erode the sustainability between human society and the earth–life system. It sets in order the efficacy and inherent problems of existing technical and systematic approaches, and comes up with viable alternative universal and global perspectives. Clinical environmental studies and basic environmental studies are like two wheels of one cart. They need to move in tandem for us to reach the solutions to environmental issues. They are the two essential elements that integrate the various existing fields of environmental studies.

By ensuring that researchers from different disciplines are working on problems at the same location, the program aims to realize the successful integration of environmental studies. Three specific locations are designated in the program: the Ise Bay Bioregion, Northeast and East Asia (China), and Southeast and South Asia (Laos). Within the Ise Bay Bioregion clinical environmental studies, a small research group led by the authors is pursuing the possibilities of spatially integrating the

different disciplines of environmental studies through the innovation of landscape planning and design ranging from regional to site scales.

Contents of This Book

This book is divided into four parts: landscape perception, planning and governance, case studies, and conclusion.

Part I contains two chapters on landscape perception. Professor Diedrich Bruns first defines cultural landscape as "what people give value to in their surroundings" and discusses how people perceive landscape. Lecturer Hirofumi Ueda then explains the differences in landscape perception in Japan and Germany that result from the fundamental difference in the ways of seeing the landscape through a cultural framework.

Part II contains two chapters on planning and governance in the Japanese context. Professor Mikiko Ishikawa shows the new trend of landscape planning and design in Japan through various cases she is involved in, including the megacity Tokyo, local cities, and tsunami-damaged areas in Tohoku. Associate Professor Hisako Koura suggests the possibility of utilizing the planning system based on the Landscape Act established in 2004 as a tool to manage developments in Japanese cities.

Part III contains four chapters on case studies in the Ise Bay Bioregion. Professor Hiroyuki Shimizu presents the results of questionnaires regarding landscape perception of residents in Nyu Village, Matsusaka City. Associate Professor Takashi Tashiro shows how to recognize the landscape sequence of the entire Kushida River through the analysis of geological distribution. Associate Professor Hiromi Yamashita studies in detail how wetlands and tidal flats are perceived by people who have not had direct contact with them in general. Associate Professor Hirokazu Kato proposes the unique concept of making a mandala of landscape issues to show the interconnected landscape elements.

Part IV summarizes the outputs of the international symposium "New Trend of Landscape Design: Seamless Connection of Landscape Planning and Design from Regional to Site Scales—The Cultural Context" held on November 5, 2012.

Nagoya, Japan

Hiroyuki Shimizu
Akito Murayama

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Part I
Landscape Perception

Chapter 1
Cultural Landscape: All That People Give Value to in Their Surroundings

Diedrich Bruns

Abstract It is thought to be important, for international communication, that it should be possible to speak about landscape without using the word 'landscape'. Not all cultures have a specific 'landscape word' in the vocabulary of their language. However, all people have landscape, and landscape is "what people give value to in their surroundings" (Landsc Res 32(5):613–633, 2007). Landscape is a cultural phenomenon that can be described by its three main constituting components: Nature, artifacts and social organization (Space, place and perception. Routledge, London, 2011). In this theoretical model, nature is considered everything that is and develops without human intervention. Artefacts include everything physical and material that is and results from human intervention. Law and order, customs and (vernacular) traditions, and other forms and qualities of common understanding of social conduct are included in the "Social Organisation" of space and place.

According to the European Landscape Convention a landscape is an area "as perceived by people". The assumption is that, rather than being mere assemblages of physical objects, landscapes are generated in people's minds. People develop ideas of what surrounds them and then they project these ideas onto an 'area'. Through this process perceived surroundings appear as "real": as landscapes (Landsc Res 29:371–383, 2004; Landsc Res 32:579–594, 2007). Human surroundings gain importance in the course of the perpetual process of perceiving and learning. Identity develops when people adopt an area (space, place) as their own, doing so individually and collectively (The European Landscape Convention: challenges of participation. Springer, Dordrecht [u.a.], 2011). It is the message of the European Landscape Convention that every landscape is special and that no area (as perceived by people) is the same as any other.

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Value is always and automatically embedded in landscape; it is never value free. Landscape is also an inherently aesthetically encoded set of symbols (Symbolic Landscapes). Hence, participatory forms of landscape design are needed in order to establish what the "areas" are that people perceive as landscape. In every planning case, the question needs to be answered: Who defines landscape, both professionally and publically? How do professionals and experts co-produce landscape inventories? How do they agree on landscape quality objectives and values subscribed to areas? This chapter discusses a number of different approaches to respond to such questions.

Keywords Discourse • European Landscape Convention • Landscape • Perception • Public involvement

1.1 Introduction

Upon arrival in Japan, and a few days before the symposium, I felt very fortunate to be invited on a tour around 'Ise Bay'. It is my first time to visit Nagoya and the Ise Bay Region. May be, you can imagine what is like visiting an area for the first time. You may have read a book about the area, looked at some pictures and consulted a couple of websites. But, by and large, a hitherto untraveled region is almost like a blank space on your personal world map. And then you arrive, and you climb into the bus, and you start travelling. You see the mountains and the sea: This is 'Ise Bay', someone explains, and the water that was 'the sea' before now has a name. You also begin to absorb details. You stop to visit some villages and, with the help of friends who interpret Japanese for you, you begin to ask questions to local people. Thus, you see more details, and these details are beginning to fill with meaning that people are giving to places: "this is my rice paddy field", and over there is the area where people gather for festivities, and on the hill behind the grocery store, this is our Shinto Shrine. At the end of the trip, when you take a look around from a high vantage point, all of a sudden you start piecing new impressions together: it is your first 'mental collage' of the Ise Bay Region. Most certainly, this eclectic image is different from anybody else's image of the same area. If we image several 'collages', mine and those of others, we might find that all of us together perceive a 'landscape'.

1.2 Theoretical Introduction

To afford transcultural understandings about landscape it might be useful to try and communicate without using the word 'landscape'. To make such an attempt is relevant because many cultures do not have a 'landscape word' available in the vocabulary of their native language. Language may be taken as mirrors of concepts that are culturally and socially specific. For example, for the purpose of identifying

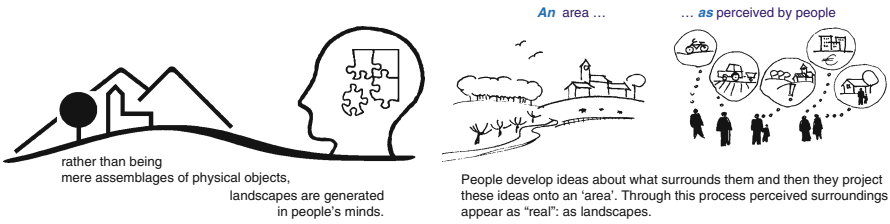


Fig. 1.1 Understanding of "landscape"

culturally specific landscape discourses from four different European countries, Drexler (2010) conducted a semantic and a cultural-historic analysis. She found, even within a relatively small part of the world, noticeable transgressions of meanings of landscape and landscape words over space and time. By comparing two countries from different continents, Ueda (2012) noted how people, when communicating about their perceived surroundings, use words and signs that clearly refer to 'landscape' even without employing a 'landscape word'.

The assumption is that, rather than being mere assemblages of physical objects, landscapes are generated in people's minds. People develop ideas of what surrounds them and then they project these ideas onto an 'area' (Fig. 1.1). Through such processes, perceived surroundings appear as "real" landscapes (Ermischer 2004; Olwig 2007, p 581; Ipsen 2011). In other words, any landscape is individually and, through learning and general discourse, socially constructed (Kühne 2013). Human surroundings gain importance in the course of the perpetual process of perceiving and learning. Identity develops when people adopt an area as their own, doing so individually and collectively (Selman 2004; Jones and Stenseke 2011, pp 5–10). Social learning and discourse are relevant in this context. Everybody learns to understand the meaning of what surrounds us, and everybody must also learn the code of landscape (Burckhardt 1977). The course of acquiring this code commences during childhood, initially by beginning to understand stereotype ascriptions to things by significant others (e.g. parents). Thereby emerge interpretive patterns of what surrounds us in our daily lives. The manner and quality by which people generally give value to their surroundings differ from the kind of attributions that academics and professionals assign to landscapes. Every academic and professional field has their very own legacy of social learning, such as gained by formal training, during the course of practice and through continuing education. Each expert group forms special bodies of knowledge that are (more or less) removed from general knowledge.

Value is always embedded in landscape; people's surroundings are never value free. Landscape is also an inherently aesthetically encoded set of symbols (Symbolic Landscapes). Hence, participatory forms of landscape design are needed in order to establish what the "areas" are that people perceive as landscape. In every planning case, the question needs to be answered: who defines landscape, both professionally and publically? How do professionals and experts co-produce landscape inventories? How do they agree on landscape quality objectives and values subscribed to areas? This paper aims to propose and discuss approaches that respond to such questions.

1.3 The Message of the European Landscape Convention

According to the European Landscape Convention (ELC), landscapes are "areas…as perceived by people" (Council of Europe 2000), where 'perceiving' refers to what people identify and "give value to in their surroundings" (Jones 2007). The character of every area "is the result of the action and interaction of natural and/or human factors". Landscape is thus a cultural phenomenon that can be described by its three main constituting components: Nature, artefacts and social organisation (Ipsen 2011). In this theoretical model, nature is considered to be everything that is and develops without human intervention. Artefacts include everything physical and material that is and results from human intervention ('anthropogenic'). Law and order, customs and (vernacular) traditions, and other forms and qualities of common understanding of social conduct are included in the "Social Organisation" of space and place.

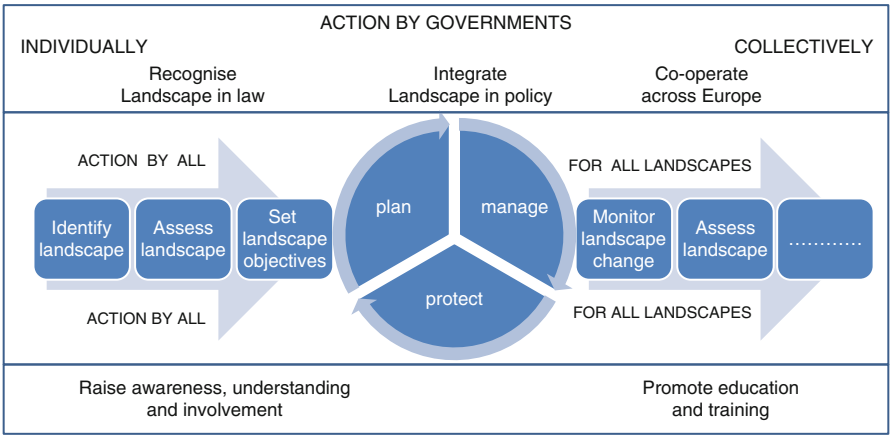
In Article 5 the ELC specifies 'general measures' and 'specific measures'. As part of the 'general measures' each signatory state undertakes, among other measures, "to recognise landscapes in law as an essential component of people's surroundings, an expression of the diversity of their shared cultural and natural heritage, and a foundation of their identity; to establish and implement landscape policies aimed at landscape protection, management and planning through the adoption of the specific measures set out in Article 6.

Specific measures are listed in Article 6. These include, among others, awareness-raising, training and education, and—most relevant for landscape architects, activities for the

- Identification and assessment of landscapes, including their characteristics and the forces and pressures transforming them, and for the take note of changes;
- Assessing of the landscapes thus identified, taking into account the particular values assigned to them by the interested parties and the population concerned;
- Defining of 'Landscape Quality Objectives' for the landscapes identified and assessed, after public consultation in accordance with Article 5.

These activities provide the basis for parties to establish and implement landscape policies that are aimed at landscape protection, management and planning. According to Article 5, parties establish procedures for the participation of the general public, local and regional authorities, and other parties with an interest in the definition and implementation of the landscape policies mentioned above. All activities listed above are not only tasks to be performed by experts alone, but include public involvement at all stages of landscape protection, management and planning.

Since landscape architects are trained to focus mainly on physical properties of landscape, public involvement is important to provide clues as to what and how people perceive beyond the material. It is the message of the European Landscape Convention that every landscape is special and that no area (as perceived by people) is the same as any other. This is true not only for outstanding places but also for people's everyday surroundings—landscape is where people live their daily lives, where people work, move, recreate, etc.: "the rest as well as the best" (Swanwick 2006). Even though everyday surroundings might differ from what experts consider the



Altered after: landscapecharacter.org.uk

Fig. 1.2 Participatory form of landscape planning and design

most beautiful or representative of a region, for individuals and locals their landscape might be the most important and beautiful of all. This phenomenon of 'the specific' has previously been described as the special 'sense of place'. Landscape and spatial sciences are also referring to the special 'Character' of a landscape.

In addition for planners to absorb local knowledge, public involvement is also thought of as means to support the raising of awareness about landscapes (O'Rourke 2005; James and Gittins 2007; Caspersen 2009). Practically, this process is enhanced by talking, discussing things, showing pictures, telling stories. I think that telling stories is important and every time people talk about a place they share ideas and visions. In sociology, we call this discourse. Discourse helps people to know they belong to a group that belongs to a place, for example a particular neighbourhood. While talking about the neighbourhood people might be referring to their park or to the nearby forest. Ideas of landscape are formed every time people meet in private and also when people have a public meeting. This concept of sharing ideas is at the bottom of participatory landscape planning, design and management (Fig. 1.2).

1.4 Participatory Forms of Landscape Planning, Design and Management

1.4.1 Case Example

What are "areas" that people perceive as landscape? Who defines them professionally and publically? How do professionals and experts co-produce landscape inventories? How do they agree on landscape quality objectives and values subscribed to areas?

The following case example serves to illustrate how to find answers to such questions. The case also illustrate how discourse-dependency might result in public-expert discrepancy.

In recent years planning experts have started to explore how the regional scale might be used more efficiently and effectively (as demonstrated in well-known cases such as the 'Emscher Park' in the Ruhr Region of Germany and the New Dutch Waterline Perspective in the Netherlands). It could, if "released" from formal rules of plan making, intermediate between the local and national scales. New approaches emerge that are "active, result-oriented and project-driven" (Meijsmans 2010); in this context people are speaking of the 'regional project' and 'regional design'. Proponents of regional design are seeing several advantages of these types of approaches, including their "explorative" and "prospective capabilities". The 'design tool' is expected to be able to facilitate governance and co-production (both are considered important in the context of sustainable development) better than standard forms of regional planning.

The following example is mainly based on a dissertation that investigates how processes of public discourse are undertaken with the aim to coproduce plans for raising peri-urban landscape quality (Peters 2011). The research includes case studies from the metropolis of Cologne and Bonn which is part of the Rhineland. The processes of public discourse that were investigated (by conducting interviews with a number of key stakeholders) are those that were stimulated by the so called 'Regionale 2010', a landscape policy programme of the State of North-Rhine-Westphalia. The way the 'Regionale 2010' was implemented for the Cologne and Bonn metropolitan region may be classified as 'Regional Design'. Wishing to depart from the typically formal nature of regional policy making authorities decided to invite members of the public to discuss regional policy options. For this purpose a design approach was adopted that simultaneously addresses landscape issues at multiple scales and levels of decision making. A regional open space system was designed at regional scale and, within this system, areas were defined that have sizes that lend themselves to be included into local and project oriented design. To keep the strategic nature of the exercise, all designs were prepared at levels of detail that did not refer to individual plots and properties; in other words: designs must be "policy compliant" (De Zwart 2010, p 79).

One aim was to try and respond to challenges that usually present themselves when attempting to conduct participatory processes at regional scales (Säck – da Silva 2009). Most importantly it was decided—by closely linking regional and local scales—to involve local stakeholders into landscape projects as early as possible. Two such projects are the so called "Grünes C" and "RegioGrün" (www.regio-koeln-bonn.de). These two projects had different approaches to process management (Table 1.1).

The example of designs for an open space system along the 'Grünes C' serves to illustrate options for conducting participatory design at regional scale. The name of this landscape project stands for the C shaped open space corridor that skirts the City of Bonn. Hence, this 'Grünes C' is a social construct, not a formally defined region for which strategic policy is usually prepared. Plans for this green system

Table 1.1 Different approaches to process management

Approach	'Grünes C'	'RegioGrün'
Contributions at scale of comprehensive planning	Designs for open space system; co-operative design competition	Designs for open space system; commission to landscape architect
Contributions at local scale and local planning		Designs for 'Green Corridors'; planning workshop
Contributions at site scale and project planning	Design commission to landscape architect	Design commission to landscape architect and also design competition

were discussed on the basis of results from a co-operative design competition. Four different design proposals were selected, by members of local governments, to be included into the 'Grünes C' discussions. Several mistakes were made in this process from which lessons may be learned for future regional design. For the purpose of this paper I will highlight experience gained during one public meeting, the first one.

During this first public meeting four landscape architects were invited to explain not their final proposal but initial ideas. Since all of the competitors were present at the same time, the presenters were careful to not reveal many details. They were speaking vaguely of "new types of landscape" and "exploring the special qualities of regional agriculture". The most articulate proposal for the green corridor had the title "Links". This corridor was comprised of a series of small parks that are stringed along a walking and bicycle path of red asphalt. Rows of trees would line this red line, and Pyramid Poplars dominate the scene. The drawings were of a kind that the poplars could easily be taken for Cypresses and the word of "Tuscanisation of the Rhineland" was quickly making the rounds (some people were complaining that the renderings had eliminated the high voltage power lines that, in the meantime, were believed to be relevant for current landscape character).

What were the mistakes made in managing the process? People took part in discussions in greater numbers that one might have expected; a great success to begin with. People were really interested. But the audience soon lost interest. They had hoped to get a chance to influence plans early, before others would make up their mind about what would be best. Expectations of municipal representatives and of the members of interest groups were also high. Apparently these expectations were not met when the designers spent much time on describing their landscape analysis (about landscapes that most people in the audience thought they know better than the invited experts) but spend little time on elucidating their proposals for the future. The landscape architects also returned to their offices disappointed. Nobody from the audience had supplied any helpful comments to their presentations.

Three lessons might be learned with reference to sustainable landscapes. First, to accommodate the needs of design competitions, all presentations must remain anonymous. Second, even early presentations must include substantial ideas and design proposals; people will only ask questions about new ideas if they go beyond vague mottos. Designers must present details, even if these are just meant to

illustrate a strategy. People will understand this and make comments in ways that designers can pick up and include during the next stage of planning. Third, the dialogue between politicians, administrators, landscape experts and members of the public must begin at an early stage. In this case, the public should have been involved when the landscape architects were selected who were invited to take part in the competition. People would then have been able to insert questions into the documents of the competition for designers to consider from the beginning. As it turned out, in retrospect, all decision making remained inside the circle of people who were members of the jury of the competition. If the process had been more open from the start even more people would have participated.

1.4.2 Addressing Dilemmas of Participatory Landscape Planning, Design and Management

If public reactions to large scale projects were taken as indicators of people's landscape awareness one might think such awareness must be very high, indeed. People turn out in droves when they get news of, say, a high speed rail line, a container terminal, or a wind power park that is destined to be built in their area. If, on the other hand, the general interest in landscape policy were taken as indicator of public landscape awareness one would think such awareness must be rather low. Few people attend public meetings of policy making, although it is here where decisions on landscape changes are prepared. We may call this the *policy-project paradox of public participation*; participation increases after decisions are made and when construction crews arrive. Apparently, projects communicate landscape matters better than policy. Projects exhibit the power of change, and also the power of those who are sponsoring such change. The policy-project paradox of public participation might be resolved, at least partly, by approaches of regional project oriented design. People are interested in landscape projects and will turn out in good numbers for public meetings, workshops, site visits.

The second dilemma considered here is that planners and administrators *depend on but often do not believe in public involvement*; they know they need public participation to democratically justify landscape policy and decisions made; at the same time, most administrators are reluctant to communicate their plans with the general public. However, as Prieur and Durousseau (2006) have pointed out (in COE 2006, pp 166–167), a landscape policy which involves only experts and administrators, who themselves are often specialist, would result in landscapes that were imposed on the public; just as in the days when landscape was produced by and for elites. Democratization of the landscape is also reflected in the degree and manner of collective and individual appropriation of landscapes; in particular it is reflected through the requirement that there must be direct participation for all in all phases of decision making regarding landscape. As Jones explains (in Jones and Stenseke 2011, p 27), the ELC makes it quite clear that the views of all interested

groups should be considered, not just scientific and political elites: "Participatory, dialogue-based approaches mean that values and meanings attached to landscapes by different groups need to be negotiated between competing interests." (Jones and Stenseke 2011, p 28). The paradox of needing but not believing in public participation might be resolved as new generations of planners and administrators are gradually replacing older ones; older generations include experts who are as qualified as younger ones but they did not grow up with a legacy of governance. Landscape and planning experts are now exposed to communicating with the public almost on a daily basis and are learning governance approaches on the job.

The dilemma that appears as the most difficult to resolve is that *what works in retrospect does not (easily) work prospectively*. People forget quickly and do not commit to long term policy. When a new major gets elected this major will want to install a new long term municipal vision, even though a sustainable development plan had previously been decided on. In the particular case of policy the question is: how can people possibly be expected to develop a critical stance concerning the accumulative effect of the sum of many different landscape interventions that might occur, incrementally, over an unforeseeable period of time? Only in retrospect, for example when a person returns after a long time period of absence, to places that were once familiar, this person might experience a great loss when much treasured surroundings have, in the meantime, made place for new ones. It is in such instances that people have acute moments of landscape awareness.

With the aim to find ways for inspiring local stakeholders to participate in discussions about sustain-ability with a long-term perspective, researchers and practitioners also suggest to use methods that are grouped under the title "participative backcasting" (Carlsson et al. 2008). Such methods appear to work well when local stakeholders are involved in discussing sustainability issues related to everyday life. Workshops are used to build on information that local people know and then develop images of sustainable life several years ahead. Such images often inspire a new awareness of seeking desirable futures (Bruns et al. 2005). The possibility of different 'Images of the Future' may be seen as means to cope with the rather likely possibility of differing opinions and values among the group of stakeholders as regards how sustainability should be implemented (Tress and Tress 2003; Anderson et al. 2003).

1.5 Concluding Remarks: Respecting 'Inclusive' Landscapes (Human Rights)

Much progress has been made on the way towards more participatory forms of landscape planning, design and management. However, many issues still need resolving, and the issues of inclusiveness and the power that particularly articulated parties exhibit by dominating over less powerful ones are such issues. It always is but a fraction of the public that gets involved: The "Usual Suspects" (Buchecker et al. 2003).

Contributions that landscape architects are making in the context of landscape visioning processes usually are communicated by visualising the invisible, i.e. the future, the remote (in space and in time) and—as is the case with regional landscape policy—the abstract. Since the time of Humphrey Repton (and most likely even earlier) landscape architects are known to supply good images to help people visualize future landscapes. In fact, designing is not just about territorial policy but *a* "cultural act" *that might precede action* but is also itself action and creates "images which, once produced, are not easily discarded" (De Zwart 2010, p 78). Modern visual imagery such as 3D and 4D might be particularly dramatic and powerful (Anderson et al. 2003; Sheppard 2012) but, just like good hand sketches, serve the same purpose of building awareness and engaging the stakeholder in discussing options and to make informed decisions (Stremke 2010).

In fact, we might conclude that Landscape Imagery might be one way of communicating about areas and space "as perceived by people", particularly when communicating across cultural borders and across social strata, without having the need to use the 'landscape word'.

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Chapter 2
Landscape Perception in Japan and Germany

Hirofumi Ueda

Abstract With increased global discussion about the natural environment, an understanding of culturally different meanings of environment is needed for local participatory environmental management as well as cross-national cooperation. In the present report, by using Landscape Image Sketching Technique (LIST), the culturally different landscape perceptions were analyzed between Japan and Germany.

The sketches of representatively beautiful scene in common with the regions were obtained through interviews with 197 respondents living in the four forest regions; namely, Rheinhardswald and North-Schwarzwald in Germany and West-Waga and Yoshino in Japan.

As results, landscape image sketches showed diverse variety in each research site, but different characteristics between Germany and Japan suggested the fundamental difference in the ways of seeing the landscape through cultural framework. The most remarkable research finding was counterintuitive and involved the opposite direction of their line of sight. It suggested different relationships between the subjects' home community and natural surroundings. In addition, the great variation of Japanese results implied Japanese challenges with landscape planning with citizens' participation.

Keyword Fukei • Landscape Image Sketching Technique • Way of seeing landscape

2.1 Introduction

Japan is an interesting example for environmental studies because of its extensive industrial development in contrast with its traditional relationship with nature. The Japanese forest coverage rate of 67 % is one of the highest in the world.

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It is said that these are the rich blessings of nature and in turn, respect, appreciation, and a concerted effort to live in harmony have contributed to a long tradition of revering the natural surroundings.

With increased global discussion about the natural environment, an understanding of culturally different meanings of the natural environment is needed for local participatory environmental management as well as cross-national cooperation. Aiming at consensus building in environmental management with democratic procedures, a communication tool for mutual understanding is profoundly needed. This report discusses the way of seeing landscapes in Japanese culture as a fundamental precondition for democratic environmental discussions.

This article consists of three parts. The first is 'Landscape' in Japanese language, which describes the historical transition and characteristics of Japanese landscape concepts. The second is a demonstration of the ways of seeing landscapes in Japan and Germany. This features the characteristics of a conceptual understanding of Japanese and German landscapes as illustrated by the results of an empirical study. The final section deals with current challenges in Japanese landscape planning focusing on urbanization and ways of seeing the landscape.

2.2 The Concepts of Landscape in Japan

Each language has its own characteristics in the definition of the terms corresponding to 'landscape'. In the Japanese language, possible prominent synonyms for 'landscape' include *Keikan* and *Fukei*. A Japanese–English dictionary explains that *Keikan* means aspect, landscape, and scenery and that *Fukei* means landscape, paysage, and scenery. It implies that these Japanese terms are hardly distinguishable by European languages such as 'Landscape', 'Paysage' and 'Landschaft'. 'Landscape' also has multiple meanings, but two of them are dominant; namely, the 'natural character of a region' and 'visual representation' (Ipsen 2006). *Keikan* and *Fukei* could correspond approximately to the two dominant meanings.

The two Japanese terms equivalent to 'landscape', *Keikan* and *Fukei* can be written in Chinese characters. Since the words have been used in various fields of research in an arbitrary manner, they are often used as synonyms and are not easily distinguished. However, the general distinction between *Keikan* and *Fukei* is the objective and subjective meaning of landscape. *Keikan* is preferred in architectural engineering and planning as well as in geography and current ecological studies, while *Fukei* is used mainly in human science (Nishibe 2006).

But why does the Japanese language have these two terms? Japanese culture developed through encounters with other cultures, in which landscape concepts also changed through the course of globalization, modernization, and urbanization. In ancient times, there was an influx of major cultural elements mainly from China such as Buddhism and writing systems. Then, in modern times (from the Meiji Restoration to the early years of the twentieth century), Japan actively adopted modern systems, mainly products of Western civilization, and the ideas of rationalism

mainly from Europe. After World War II, accepting the American culture, Japan became a democratic country, attained rapid economic growth and became a country that is rich in material things (Berque 1990).

Concerning landscape concepts, the first step was the introduction of *Fukei* from China in the eighth century through the teachings of Buddhism, which continues to be a part of Japanese culture today. Especially at that time, China was the most important foreign country for Japan, and following China was an inchoate form of globalization. The introduction of Buddhism prompted many foreign policy discussions, and eventually it came to coexist with the original Japanese religion, Shintoism. The term *Fukei* represented the Buddhist universe as an impression of the world. Consequently, the meanings of *Fukei* covered every perceptible environment.

The second step was the introduction of the German word Landschaft through the course of modernization in the twentieth century. After almost 300 years of isolation, Japan opened its doors to the West during the Meiji era. Ever since that period, Japan has pursued modernization by making its national policy "escaping Asia for Europe". Japan had to adapt everything to the European way, its politics, its economy, and in part, its culture. Japan digested knowledge from the West and improved and utilized it while adapting it to the Japanese situation.

From Germany, Japan introduced many ideas to the field of natural science. The modern scientific idea of landscape that is Landschaft was also introduced to Japan and interpreted into the Japanese language (Abe 1995). To interpret this new concept, a new Japanese word *Keikan* was coined using Chinese characters. Thus, *Keikan* is connected to scientific and modern concepts that have been introduced from Western countries and permeated across Japan through the modernization of the twentieth century.

The latest significant change of landscape concepts began under the rapid economic development and urbanization after World War II. To improve the unplanned expansion of urban areas, urban planners needed an objective discipline and control. Consequently, the modern idea of *Keikan* became popular in the context of urban planning, rather than through the long tradition of Japanese cultural adaptations complete with emotional and religious transformation. Nowadays, we use the two words *Keikan* and *Fukei* as objective features of the landscape and subjective impressions of the landscape in an arbitrary manner in discussions of landscape planning.

In parallel with the discussions, Japan intends to introduce one more concept related to landscape. Japan is exploring a new National Spatial Planning Act that considers landscape conservation in the context of Japan's declining population. It involves utilizing 'landscape' as a loan word, and ensuring that the definition of 'landscape' is equivalent to the European Landscape Convention where 'landscape' is seen as an area, perceived by people, whose character is the result of the action and interaction of natural and/or human factors (Council of Europe, 2000, Chapter I). This is why the European Landscape Convention gets a lot of attention from a remote non-EU nation, Japan. In terms of interaction between natural and human factors and characteristics of each region, the recently introduced concept of 'landscape' is expected to serve as an alternative to link the Japanese concepts,

Keikan and *Fukei*. However, it is time to review the ways of seeing landscape considering the cultural relationship with our own life-world which can offer an insight to overcome the rhetorical discussion and to realize a democratic environment management.

2.3 Comparative Studies on Ways of Seeing the Landscape Between Germany and Japan

To elicit the cultural way of seeing landscapes empirically, a drawing method was adopted. A sketch drawing is one kind of representation of one's landscape imagery. Like mental mapping by Lynch (1960), the sketch can be interpreted with some main elements based on the tenets of Gestalt psychology (Nakamura 1982). The drawing process induces people to associate landscape elements and build a composition in a frame. The represented sketch shows us the respondent's viewpoint and distance from the scene as well as the composition of figure and ground in the sketch. In addition to that, it is also expected that the drawing process can elicit explanations of the view, which in turn promotes more vivid narratives and concrete information about one's notions and attitudes toward the landscape. It means that the sketch represents what the respondents look at and how they view the landscape (Ueda 2009).

The visual data are analyzed not psychologically or pathologically as clinical drawings, but in terms of cultural comparison: what kind of landscape elements the people imagined. They composed a scene through interconnection of the elements and the self-oriented field of view. Hence, the ways of seeing the landscape can be reflected by the visual data drawn or reported (Ueda et al. 2012).

Figure 2.1 includes four examples of landscape image sketches representing forest imagery. The first one is a close up view of a forest composed of just trunks of trees appearing in the near distance. The second one is a sideways view combining various landscape elements such as a mountain, the sky, a forest and a lake representing a scene in the middle and a faraway distance. The third one is a bird's-eye view of a surrounding place. It describes the horizontal structure and wide expanse of the landscape. In the fourth sketch, the observers themselves or the setting of their standpoint, such as trails, vehicles and houses are drawn into the sketches

Fig. 2.1 Examples of landscape image sketches

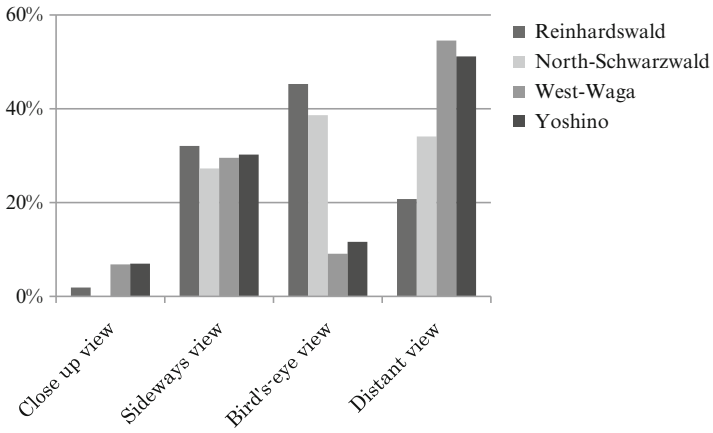

Fig. 2.2 View of landscape image sketches

to explain their activity. The standpoint is sometimes surrounded or separated from other landscape elements describing the spatial continuity and accessibility to the forest.

Here we show the results of landscape images from an aesthetic standpoint. The following question was asked, "What kind of a picture would you take for a typical postcard in this region?" It was expected that subjects imagined a representatively beautiful scene in common with the region. The experiments were conducted in Japan and Germany. Since the experiments were carried out as a study of forest awareness, the research areas were selected in forest regions. Consequently, the sketches were obtained through interviews with 197 respondents living in the four forest regions; namely, Rheinhardswald (n = 58) and North-Schwarzwald (n = 50) in Germany and West-Waga (n = 46) and Yoshino (n = 43) in Japan.

As results of landscape image sketching, the represented distance and viewing angle showed different characteristics at a national level (Fig. 2.2). Many landscape images represented panoramic views, but the viewing angle was different. The results at German research sites were characterized by a 'bird's-eye view'. On the other hand, the results at Japanese research sites were characterized by a 'close-up view' and 'distant view'. The results seem to clearly reflect the different definitions of 'landscape', namely 'spread of district' in Germany and 'scenery' in Japan.

The result of self-orientation, which was interpreted by the position of the standpoint, showed the different cultural ways of viewing and idealizing the landscape more clearly (Fig. 2.3). The main trends are similar to the foregoing analysis; the results reflected more obviously the basic definition of *Landshaft* in Germany and *Fukei* in Japan. At the German research sites, the landscape aesthetic was represented as an expansion of the regional district, while in Japan it has connotations of scenery. Furthermore, the environment is perceived in Germany as one's surroundings, in which the subjects' own standpoints are also represented as external aesthetic motifs.

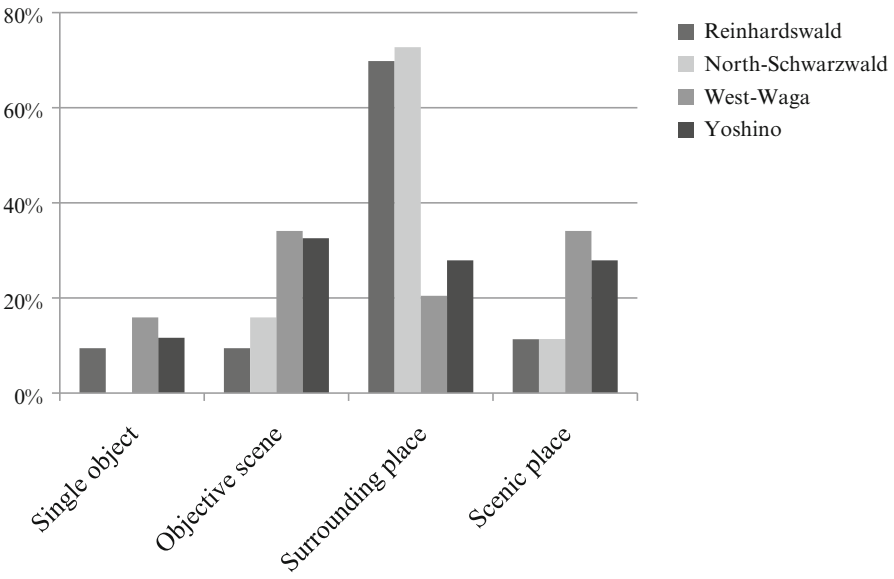

Fig. 2.3 Self-orientation of landscape image sketches

Conversely, Japanese perspectives point outwards. This empirical result offers significant proof and new insight into understanding the different landscape perceptions and the meaning of life-world in both nations.

The main motifs of the sketches were considered from the visual landscape elements and verbal accounts and classified into the following seven categories.

1. Seasonal change: a beautiful scene visible only in a specific season, at otherwise uninteresting places
2. Natural landscape: a combination of natural elements in a certain location
3. Recreational activities: a combination of the natural landscape and viewpoints
4. Cultural landscape: a synergistic effect between the local natural environment and human activities through primary industry
5. Home community: a description of their own settlements from the outside
6. Historic and memorial architecture: a representative historic place
7. Infrastructure: a construction project such as a bridge and hydroelectric dam

In Fig. 2.4, the categories were arranged from natural landscapes to artificial, showing the different preferences towards natural and cultural landscapes at each research site. At Japanese research sites, ‘seasonal change’ is significant and a preference for natural elements emerged, which also suggests a temporal way of seeing the landscape. On the other hand, the German answers were biased in favor of cultural landscapes. The motif of settlements such as ‘home community’ and ‘historic architecture’ in Reinhardswald is especially noticeable, but North-Schwarzwald doesn’t have an outstanding motif for postcards, which may suggest a large variety of motifs in the cultural landscape. In comparison with the Japanese description of

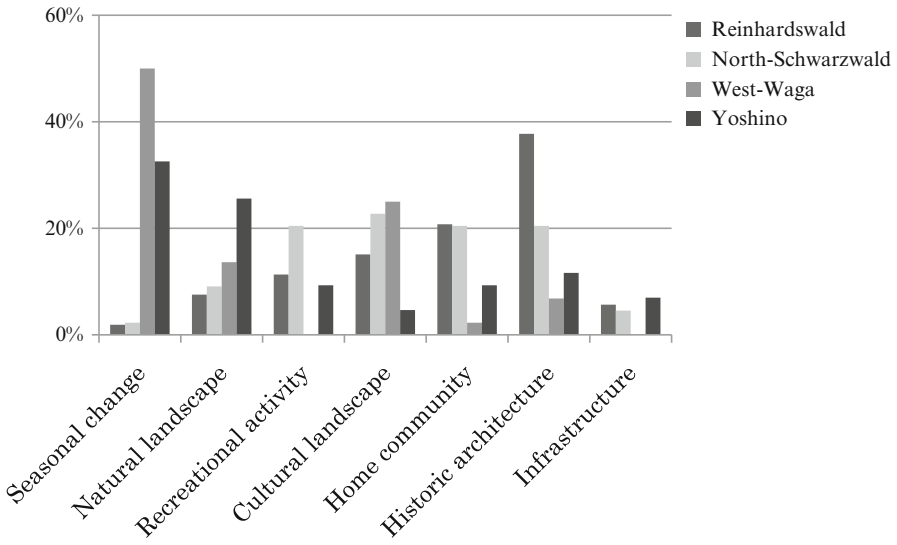

Fig. 2.4 Main motifs of landscape image sketches

temporality, German motifs such as 'cultural landscape', 'home community' and 'historic architecture' are characterized by spatiality and sustainability.

As we have seen, the most remarkable research finding was counterintuitive and involved the opposite direction of their line of sight. It suggested different relationships between the subjects' home community and natural surroundings. In Germany, people tended to draw historic architecture and their home communities, which are composed of houses and settlements. The pictures are often viewed from a bird's-eye view. That is, an inward-looking focus on the surroundings. On the other hand, in Japan, natural landscapes and their seasonal changes are represented by mountains and water, and in the study they were often a combination of foreground and a distant view describing an outward-looking focus on scenic views.

The ways of seeing the landscape in Germany and Japan can also be discussed in the context of landscape planning (Fig. 2.5). A different range of time and space tends to be taken into consideration depending on the different concepts. An inward-looking focus on an inhabited area in Germany is represented as an aesthetically cultural landscape. German sketches describe a sustainable system in a certain spatial range. It could be a representation of an awareness of their life-world. In Japan, an outward-looking focus toward a natural landscape represents scenic harmony in a certain temporal moment. It could be a representation of the Japanese connection to nature throughout the four seasons.

Through the experiments, the way that many Japanese tend to see landscapes appears to be based on the concept of *Fukei*. As Kato (2007) reports, Japanese culture is connected with the concept of the 'here and now', in which the quality of an independent part is emphasized rather than the whole structure. The ways of seeing landscapes must also be related to a cyclical sense of time through the four seasons and a spatial awareness of boundaries in mountainous land.

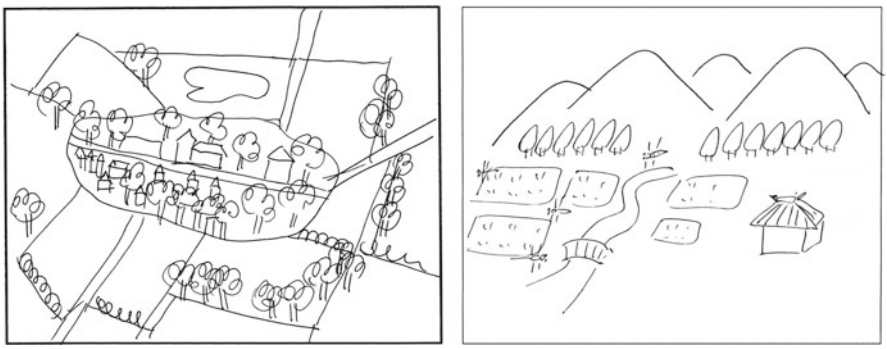

Fig. 2.5 Examples of landscape image sketches in Germany (*left*) and Japan (*right*)

2.4 Japanese Challenges with Landscape Planning

As for landscapes in the context of urbanization, nature, which is apt to be the center of one's orientation, does not exist in our usual life-world. A direct relationship with nature is becoming much less common in our modern lifestyle. The traditional concept of landscape *Fukei*, on the one hand, and the current lifestyle that has been mostly introduced through western countries on the other, do not fit together well. It can be why the idea of *Fukei* does not hold a prominent position in the discussion of urban planning in Japan. How to fill the gap between them is the current challenge facing Japanese landscape planning.

Comparing with Germany, the Japanese outward-looking focus toward a natural landscape could be connected with disregard for our own life-world. Considering Japanese challenges with landscape planning, however, can it be accepted to regard the ways of seeing the landscapes as unavoidable given cultural differences?

The opposite direction of line of sight can be compared to the figure-ground relationship in the visual perception of the Rubin Vase: the figure-ground relationship of a residential area and natural surroundings in the regional landscape appears as a reversible structure which changes depending on a context but cannot be observed simultaneously (Fig. 2.6). The direction of line of sight can be switched with the slightest of opportunities. For example, new viewpoints around settlements could offer an inward-looking focus like in Germany.

This hypothesis was generated in an ongoing similar study in Sapporo, a big city with a population of 1.9 million. Incidentally, it is said that Sapporo is the most attractive city in Japan. We found that citizens who have more emotional attachment to the city tend to associate mountains more frequently as a representative scene of the city. The result underpins a Japanese centrifugal line of sight that was observed in the Japan–Germany comparative study. Moreover, it implies the connection between ways of seeing the landscape and possessing a regional identity. In addition to that, more noteworthy results were various responses about the

Fig. 2.6 Rubin Vase

inward-looking focus on the city. Sapporo is surrounded by low hills and mountains, which enable the citizens to look down at their own everyday life-world from outside. It suggests the connection between the ways of seeing landscapes and their emotional attachment to the hometown. This hypothesis requires further validation but can be a key approach for Japanese landscape design. To resume the feeling of orientation and attachment to one's life-world, both clear views to the immediate natural surroundings as well as natural trails for regional perspective need to be reserved.

A landscape can be described as the physiognomy of the city. Character and health condition occur in its appearance. Conversely, we can judge the conditions by the expression. Like a body check in the mirror in a lifestyle, frequent scenes of landscape perspective can raise the awareness and responsibility to your life-world.

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Part II
Planning and Governance

Chapter 3
New Trend of Landscape Planning and Design in Japan

Mikiko Ishikawa

Abstract In Japan, we have a long tradition of gardening since seventh century. Originally, it was developed by the influence from China and Korea, however, gradually the style of Japanese garden had been established. The characteristic of Japanese garden is divided into three aspects. The first is the creation of micro cosmos, even though the size of garden were tiny. The second is the methodology of gardening which is always tried to integrate with the surrounding landscapes. The third is the emphasis of concept of time, through the delicate planting design. Based on above common principals, various Japanese gardens, such as Zen garden, tea ceremony garden, strolling around garden, has been developed up until the middle of the nineteenth century before the modernization took place. This era could be called as Era of Culture.

After Meiji Revolution in 1868, Japan experienced rapid modernization. It was a departure from traditional methodology of gardening, and the modern park movement took place all over Japan. The modern park movement of Japan was totally different from western one. It was not the revolutionary citizen movement, but a kind of historical heritage preservation movement, related with the reformation of land tax system of new government. The old shrines, temples and ruins of castles were designated as a modern park, and owe to this policy, precious historical gardens and landscapes were preserved. The landscape planning and design related with city planning, introduced through the reconstruction from the Great Kanto Earthquake in 1923, and it was succeeded to the reconstruction plan after the World War II. The methodology was the park system, which was intended to prevent the expansion of fire by the network of parkways, canals, rivers and parks. In addition to park system, in 1930s, Japan introduced the concept of open spaces, and established a green circular plan in Tokyo, influenced from Grungrurtel Plan in Berlin.

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In 1960s, Japan experienced rapid economic growth and after the collapse of bubbling economy, a new trend of landscape planning and design emerged. It could be said to seek for the symbiosis between human beings and nature.

In this paper, I introduced the methodology of the creation of natural symbiosis city and region as a new trend of landscape planning and design. We call it "Natural Symbiosis City based on Watershed Management". The basic components of this methodology divided into three principals. The first is the designation of watershed units as a base of landscape planning. The second is the analysis of ecological structure within the watershed. The third is the implementation of landscape design together with the citizen collaboration.

Keywords Ecological structure • Flood mitigation • Historical perspective • Natural symbiosis city • Watershed management

3.1 Historical Perspectives of Landscape Planning and Design in Japan

3.1.1 Era of Culture

In Japan, we have a long history of gardening. The concept of garden was originally influenced by Syumi-sen Thought in China. It is said that in the southern ocean there existed the utopian island where the sacred man who has ever lasting life. The garden was created as a symbol of this utopian island. Even though the style of Japanese garden has changed time on and one, the following three principals are the basic structures. The first is the creation of micro cosmos, the second is the integration of surrounding landscapes, and the third is the clear message for the difference of time.

Figure 3.1 is Katsura Imperial Palace in Kyoto, build in seventieth century. Katsura is a kind of synthesis of different garden styles, consisted from utopian-island thought, Shinden Garden in eleventh century, and tea ceremony garden developed in sixteenth century. By introducing the experiences of strolling around, the different styles were combined into one continuous story, and people found a freedom to enjoy garden whatever they were interested in. The discovery of freedom was an epocmaking incident, and after Katsura, many strolling around gardens have been created.

Figures 3.2 and 3.3 is Syugakuin Imperial Palace in Kyoto, build at almost same era of Katsura. The innovation of Syugakuin is, they opened up the essence garden, that is the structure of micro cosmos, to the normal country side without losing the pure gardening characteristics. It is called the method of "Borrowing Landscapes". This method was not the original of Syugakuin, but as Fig. 3.4 shows, harmonization to the surrounding environment had been a major concept of Japanese culture. Figure 3.4 is Itsukushima Shrine was built in the end of eleventh century at Seto Inland Sea Area. The temple was carefully set up, considering the surrounding mountain peaks, and the movement of tide.

Fig. 3.1 Katsura Imperial Palace

Fig. 3.2 Syugakuin Imperial Palace (*Middle*)

3.1.2 Era of Modern Park Movement (1873–1918)

After the Meiji Revolution in 1868, Japan experienced a rapid modernization. Meiji Government introduced not only law, science and technology, but they found the city planning was important, and park was an essential infra-structure of modern city.

Fig. 3.3 Syugakuin Imperial Palace (*Upper*)

Fig. 3.4 Istukushima Shrine in Seto Island Sea

At that time, in Japan we did not have public parks. However, the open spaces of shrines and temples, or bank of river, have been traditionally used as a similar facility of park. In 1873, Meiji Government sent the ordinance to all municipal governments that they have to submit the appropriate places which should be designated as modern park. The municipal government followed this ordinance, and they selected the

Fig. 3.5 Shiba Park in Tokyo in 1900s

most precious cultural places in their city and asked the petition to be designated as modern park. Most of famous parks in Japan were designated park based on this ordinance. Figure 3.5 is Shiba Park in Tokyo which was designated as park, but actually it was a complex of samll temples and tombs of Tokugawa Syogun.

3.1.3 Era of Park System and Regional Planning (1923–1945)

In 1923, Great Kanto Earthquake had occurred and down town Tokyo had completely destroyed. Figure 3.6 is the analysis map how fires had expanded. It was proved that forests, parks, cliff lines, canals and rivers prevented the expansion of fire. The reconstruction took place immediately, and the method of parks, parkways and boulevards system (park system) was introduced. The park system had developed as a planning method of city planning, especially in United States, Chicago, Boston, San Francisco. In Tokyo, the core forest was Imperial Palace, and major parks, shrines, temples are preserved and connected with canals, moats and newly planned wide roads.

After Great Kanto Earthquake, Tokyo had expanded rapidly. In 1937, she combined adjacent towns, and became the city with 5,000,000 population. The theory of regional planning was introduced, and Tokyo Green Space Plan was established in 1939. Figure 3.7 is the plan of the central area of Tokyo, and green circular plan was established, influenced by Grungrurtel Plan in Berlin. It is important to notice that the basic structure of modern city of Tokyo was established by this plan.

Fig. 3.6 Extension of fire (Great Kanto Earthquake)

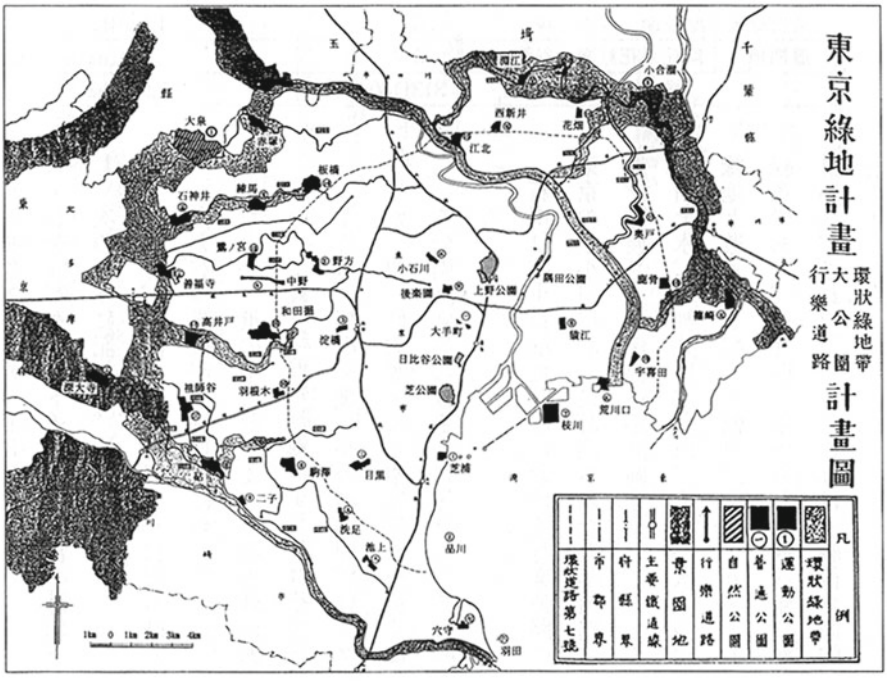

図 5-27　東京緑地計画環状緑地帯・大公園・行楽道路計画図

Fig. 3.7 Green circular plan of Tokyo (1939)

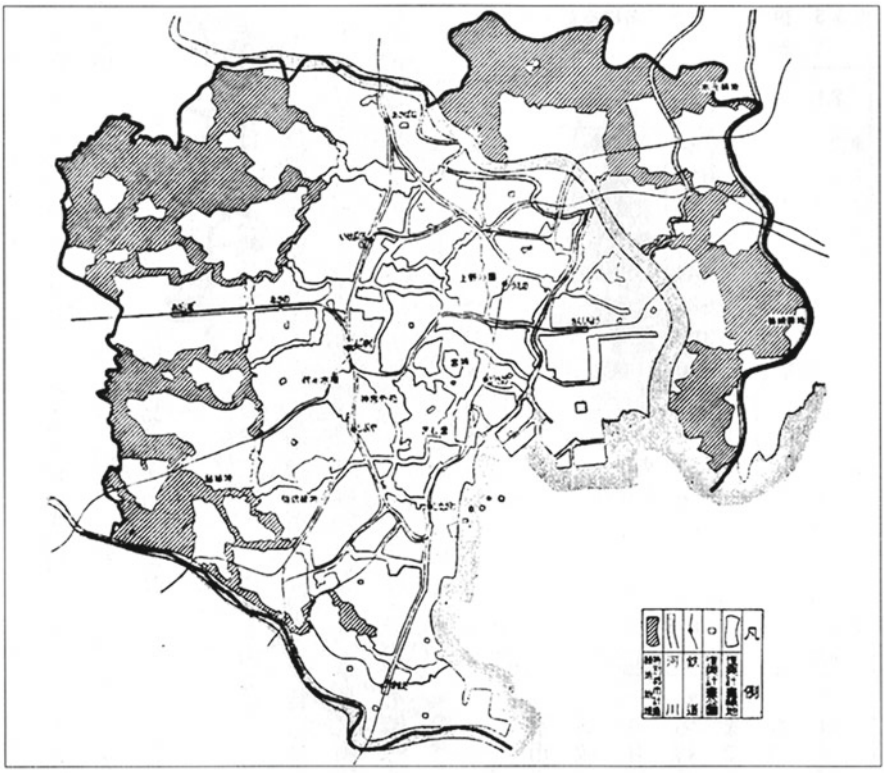

図 5-34 復興計画緑地及び公園図(1948 年)

Fig. 3.8 Green belt plan of Tokyo (1946)

3.1.4 Era of Reconstruction and Rapid Growth (1945–1970s)

The rapid urbanization took place after the World WarII. As for landscape planning, green belt policy had introduced based on Tokyo Green Space Plan. Figure 3.8 is the green belt, surrounding the edge of 23 Wards. Rivers were designated as corridors to connect inner areas. Major parks have been kept to purchase, even now, but the areas applied only by zoning control had been abolished.

3.1.5 Era of Renovation (1970–2000s)

After the collapse of bubbling economy, the movement of urban renovation took place. Various landscape planning and design had carried out, and I will explain the recent example in the following chapter. In this chapter, I introduce three typical examples which I have worked for. The first is the creation of seaside park,

Fig. 3.9 Odaiba seaside Park

Fig. 3.10 Ni-i-jyuku Mirai Park

Odaiba Park (Fig. 3.9). There used to be a stock yard of wood, and converted into park in late1970s. The second is the restoration of Tamagawa Canal in Shinjyuku. It is the main canal to bring drinking water from Tama River to Edo. The attempt was made to create sub water way in the midst of Shinjyku. The third is Ni-i-jyuku Mirai Park (Fig. 3.10), which is the renovation of old Paper factory, opened in 2013. These are the new trend of landscape design.

3.2 The Methodology of Natural Symbiosis City Based on Watershed Management: In Case of Metropolitan Tokyo

3.2.1 Watershed as a Planning Frame of Landscape Planning and Design

Entering the twenty-first century, the number of mega cities, which has the population over 10,000,000, has been increasing. In 1985, the number of mega city was 9, and in 2003, it became 25. Therefore, the risk management and urban regeneration of mega cities are the urgent issue. Tokyo Metropolitan Area is the largest megalopolis in the world, having 32,450,000 populations, whereas the second one is New York having 21,610,000 in 2003. In this chapter, firstly I will discuss about the new trend of landscape planning and design based on watershed management, focusing the inner districts in Tokyo.

Figure 3.11 is the watershed of metropolitan Tokyo. For supporting huge populations, the comprehensive plan for watershed management policies established starting

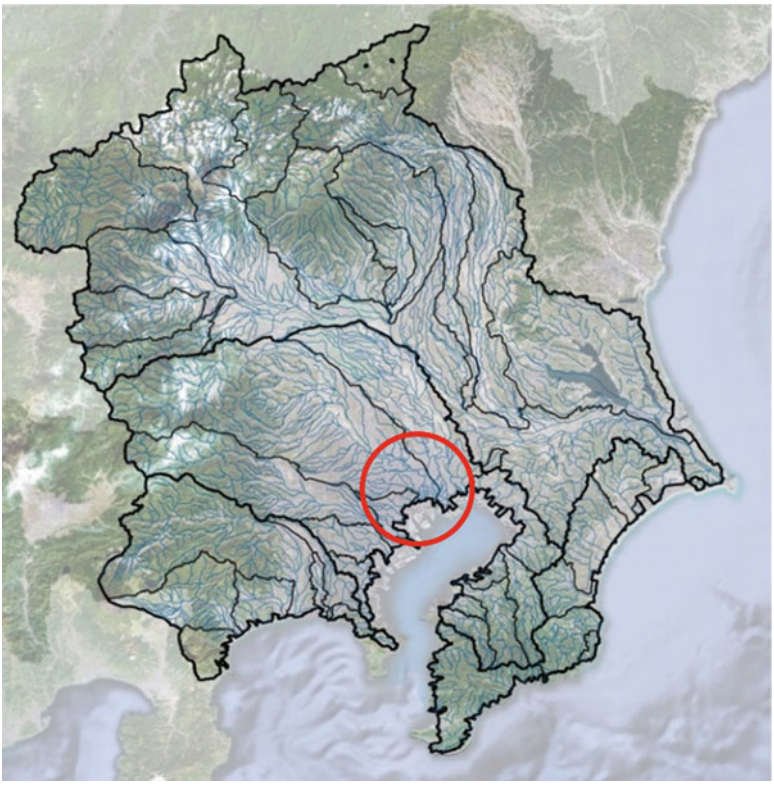

Fig. 3.11 Watershed of metropolitan Tokyo

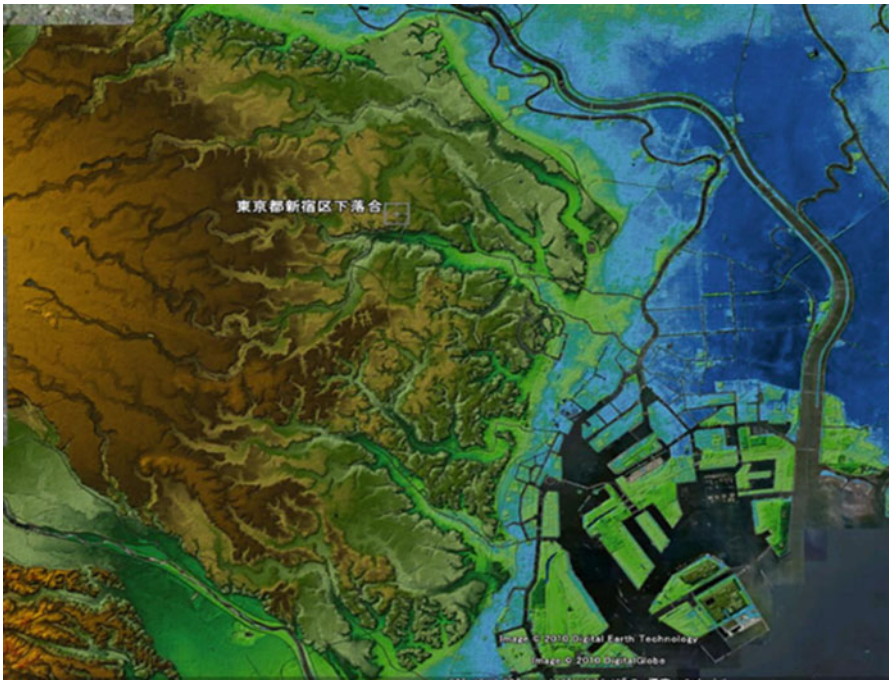

Fig. 3.12 Geological characteristics of Tokyo

from 1947, and seven major dams and one flood control reservoir have been developed. However, recent issues are the urban flood. Frequencies of urban flood are increasing, and once it occurred the damages are serious. The following approach is how to solve these problems, activating the methodology of landscape planning and design.

The red circle in Fig. 3.11 is the inner district of Tokyo (23 Wards). Figure 3.12 covers almost same area of 23 Wards. Characteristics of Tokyo could be explained clearly by this geological map.

The configuration consisted from plateau and tiny valley is the fundamental structure of Tokyo. The upper areas were used to be residential districts of Samurai, and in the valley area there located complex community of merchants, craftmen and peasants.

Between plateau and valley, there exist cliffs. Figure 3.13 is the existing green spaces in Tokyo, and cliff lines are the last green spaces which have been succeeded since Edo era. Along cliff lines, there located many shrines, temples and gardens of Daimyo. Cliff line could be said a hidden cultural zone in Tokyo (Fig. 3.14). We have been working for the preservation of green spaces in cliff line. Recently, by combining watershed management and green preservation, the new progress of landscape planning and design were attained. I will explain this process one by one, using the case study of Ochi-ai cliff line in Kanda River watershed.

Fig. 3.13 Green spaces in Tokyo

Fig. 3.14 Gardens in Ochi-ai cliff line in 1930s (Soma Garden)

3.2.2 Analysis of Ecological Structure

Figure 3.15 is the present condition of Ochi-ai Cliff in Kanda River watershed. This area is highly urbanized, and as mentioned above, the cliff line is the only place where natural vegetation remains. We carried out the extensive survey of vegetation based on the phytosociology method (Braun-Branquet 1964), and by combining micro geography, spring water distribution, and vegetation structure, 16 biotope types were classified.

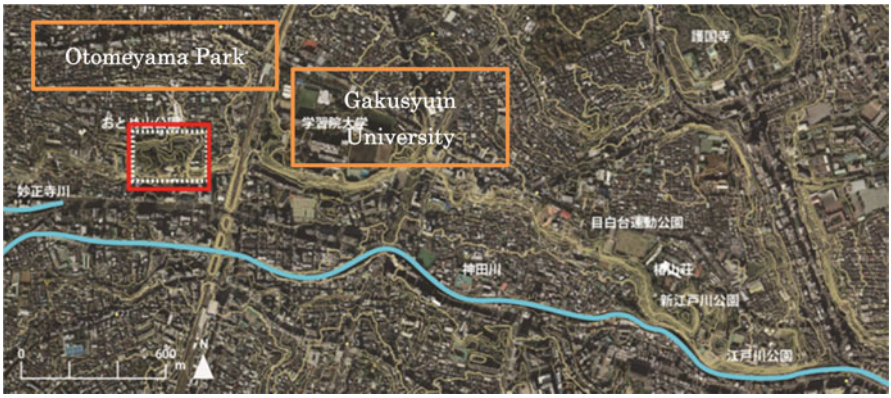

Fig. 3.15 Present conditions of Ochi-ai cliff line and the location of Otomeyama Park

Figure 3.16 is the bio top map of Otomeyama Park. The major bio tope type is deciduous secondary forest in plateau. Along cliff line, there developed various bio topes such as deciduous forest along the spring point, deciduous forest along steep slopes, wet land vegetation in valley area. Each biotope has different characteristics. Since it locates in the midst of highly urbanized area, it is important to set up the guideline how to seek the balance between bio diversities and human activities. Therefore, it is essential to work with citizen for achieving this aim.

3.2.3 Citizen Participation for Reforming Natural Symbiosis City

Along Ochi-ai cliff line, there exist many citizen movements since 1960s. Typical one is the preservation of Otomeyama. Otomeyama was used to be the eagle hunting place of Syo-gun, and basically it was prohibited to enter. After Meiji Revolution, it was sold to the aristocrats, and the family of Soma maintained their house and Japanese garden (Fig. 3.14). After World War II, it was sold to the residence of company president, and in 1960s, again it was sold to national government for housing of the executive officers. At that time, strong movement for preservation of forest was occurred, and patrial area was preserved and Otpmeyama Park was opened.

However to recover original forest is a long dream of citizen, and finally, in 2010, the mayor of Shin-jyuku Ward, Hiroko Nakayama, decided to purchase the adjacent land of Otomeyama Park and converted it into park. The council of Shin-jyuku Ward approved her proposal, and 700,000,000 yen was spent to purchase the land. Figures 3.17 and 3.18 is the scenery to destroy the governmental officers' apartments and converted into the park.

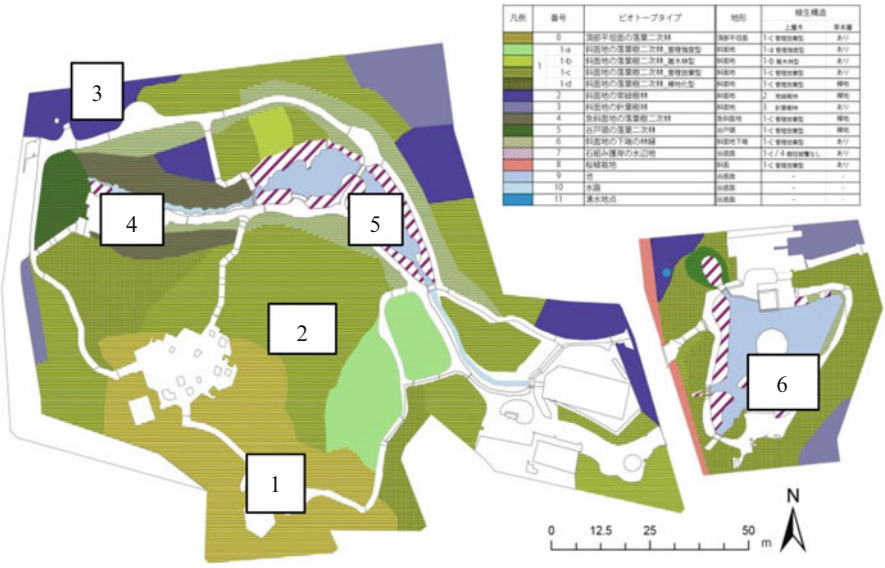

Fig. 3.16 Bio tope map in Otomeyama Park. Bio tope type 1: deciduous secondary forest in plateau. Soil depth is thin and ground surface is dry. The general condition of forest is abundant, and bamboo grass of lower level of forest should be controlled for enriching bio diversity. Bio tope type 2: deciduous forest in slope. Soil changes from dry to wet, and various spices exist following the gradual changes of the environment. Important bio tope for bio diversity. Bio tope type 3: ever green forest in slope. Japanese Cypress, and Cedar. Abundant forest. Because of the lack of sun light, soil erosion occurs. Bio tope type 4: spring and surrounding forest. Most important bio tope and careful preservation should be introduced. Bio tope type 5: wet land along small stream. Fragile bio tope. The usage of people should be controlled carefully. Bio Tope type 6: pond surrounded by deciduous forest. Open landscape in the wood. Recreational use would be encouraged

How to rebuild the natural environment of Ochi-ai cliff is the major issue. Since committee has been set up for this purpose, the bio tope approach became the fundamental methodology of the restoration.

Figure 3.19 is the bio tope plans including expansion areas of Otomeyama Park. Based on this plan, the restoration of park has partially implemented. Most emphasized aspect was to revitalize the water flow from the cliff line. Careful preservation of spring point and underground waterway was implemented, and new water way was created (Fig. 3.20). Also, many deciduous trees have planted (Fig. 3.21), for enriching the rain catchment potential and bio diversity. The total area became 2.5 ha, whereas the former area covers 1.5 ha. It is important that citizen and children could see and touch spring water, which has been thrown out to the sewer for long time.

Fig. 3.17 The demolish of government officers' apartment in December 2012

Fig. 3.18 Park development after the demolishon

3.2.4 Landscape Planning for Mitigating Urban Flood

In addition to improve bio diversity, we examined the capability of rain fall catchment of different types of forest. There are five types of forest, and by introducing artificial rainfall experiment to each type of the forest, we could estimate the water

Fig. 3.19 Bio tope plan for the extension area of Otomeyama Park

Fig. 3.20 Created small stream in the extension area of Otomeyama Park in April 2013

permeability of each type of forest. It was estimated that type b, which is a typical deciduous forest in this area with multi layers trees, has the highest ratio of water permeability (Fig. 3.22).

Fig. 3.21 Tree planting in the extension area of Otomeyama Park in April 2013

Then, we introduced the coverage area of sewer catchment as a frame of urban artificial watershed (Fig. 3.23). It becomes possible to calculate water permeability of each area by carrying out the vegetation survey. By introducing these units, we could compare the effect of different green policies for mitigating urban flood.

Figure 3.24 is the distribution of watershed units in the upper part of Kanda River Watershed. By introducing different scenario of green policy, such as increasing the ratio of green coverage, improving the quality of forest, introducing roof garden, we can estimate the effective way for the mitigation of urban flood.

Figure 3.25 is the watershed along Tokyo Bay area, and by introducing the simulation of different green policies for the water permeability, we could estimate the effective strategy for urban flood. Also, blue circle are the core of ecological parks along Tokyo Bay. We have been developing coastal park to enrich bio diversity since 1960s. Odaiba sea side park, Kasai sea sidepark, Yatsu wet land park, O-hi wild birds park (Fig. 3.26).

Connecting ecological cores, corridors, and watershed management as matrix, landscape planning and design turn to be new methodology for the reformation mega city.

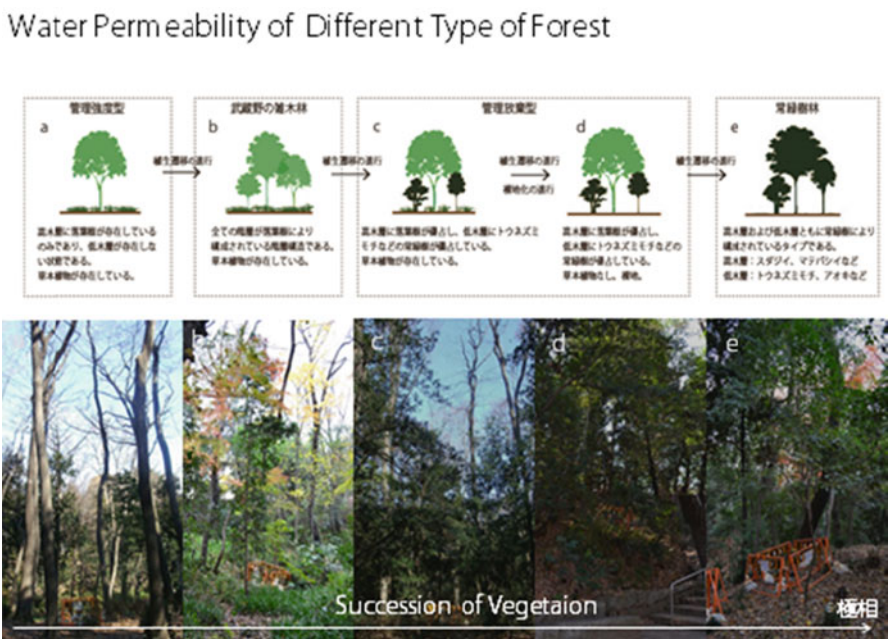

Fig. 3.22 Different type of forest based on the succession of vegetation. **a**: deciduous forest without lower shrubs (water permeability 428 mm/h) (bio tope type 1). **b**: deciduous forest having multi layers trees and shrubs (wp: 494 mm/h) (bio tope type 2, 4). **c**: abandoned deciduous forest having ever green trees in lower level (wp: 486 mm/h) (bio tope type 1). **d**: abandoned deciduous forest having ever green trees in lower level and no ground cover plants (wp: 435 mm/h) (bio tope type 1). **e**: ever green forest (wp: 265 mm/h) (bio tope type 3)

3.3 The Methodology of Natural Symbiosis City Based on Watershed Management: In Case of Rapidly Developed Suburban City. Kakamihara City in Gifu Prefecture

3.3.1 Issues in Kakamigahara City

Second example of Symbiosis City based on watershed management is the case of local city where urban-rural restoration is expected.

Kakamigahara City locates in the metropolitan area of Nagoya (Fig. 3.27). She has been developed as a historical city along Nakasen-do which was the major road to connect Kyoto and Edo (former name of Tokyo). The population in 2013 is 148,000.

Fig. 3.23 Sewer catchment area adjacent to Otomeyama Park. *Green line*: sewer catchment area, *Red Point*: location of manhole

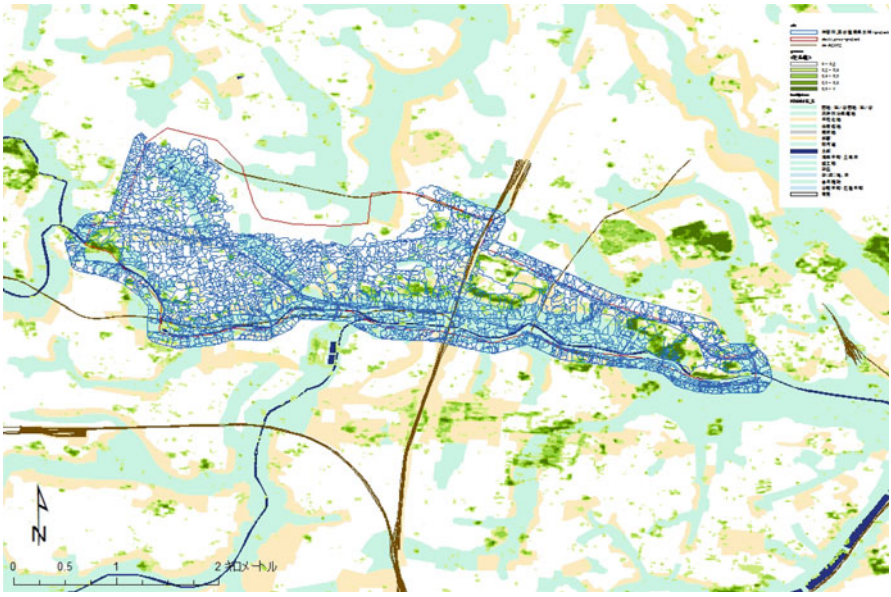

Fig. 3.24 The distribution of small watershed units in the upper area of Kanda River watershed

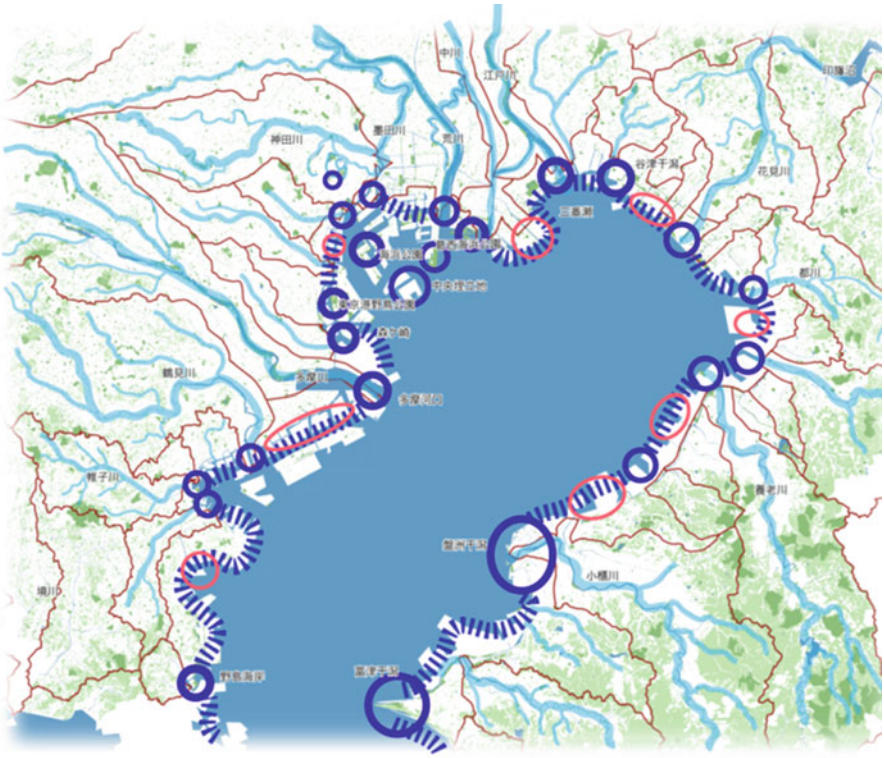

Fig. 3.25 Watershed along Tokyo Bay area

Fig. 3.26 O-hi wild birds park

Fig. 3.27 Location of Kakamigahara City

In 1930s the army base was established on the plateau of Kakamigahara, and the aircraft industries have been developed. In 1960s a rapid urban growth took place and adjacent hills were turned into residential zone. The forest had been abandoned, and many problems, such as, forest fire or illegal garbage dumping occurred (Fig. 3.28).

After the collapse of the bubbling economy around 1980s, gradually, the citizen movement occurred for seeking for natural symbiosis city. Since drinking water in this city comes from ground water from Satoyama which used to be a kind of commons for collecting fire woods, people were very conscious about the effect of pollution caused by development. In late 1990s, the private developer bought the land for building industrial garbage dumping site at water recharge area. City immediately stopped the construction and bought the land for creating park (Fig. 3.29). For establishing the long-run green policy of total city, the city set up the committee to make grand design based on the Green Preservation Law in 2000.

3.3.2 Green Corridor Plan for Park City

First of all, the committee started to carry out the extensive survey of existing conditions of water, vegetation, landscapes and wild lives. The analysis of watershed unit was introduced, and the committee established a basic strategy to introduce a small watershed management as a grand green design of the city (Fig. 3.30).

Fig. 3.28 Abandoned forest

Fig. 3.29 Citizen participation for planting trees

Then, the committee developed the clear vision which would be easy to understand, even for children. Figure 3.31 is the vision of Park City, consisted from three corridors, Forest Corridor, City Corridor, and River Corridor. At the crossing points of three corridors, seven cores of Parks were planned.

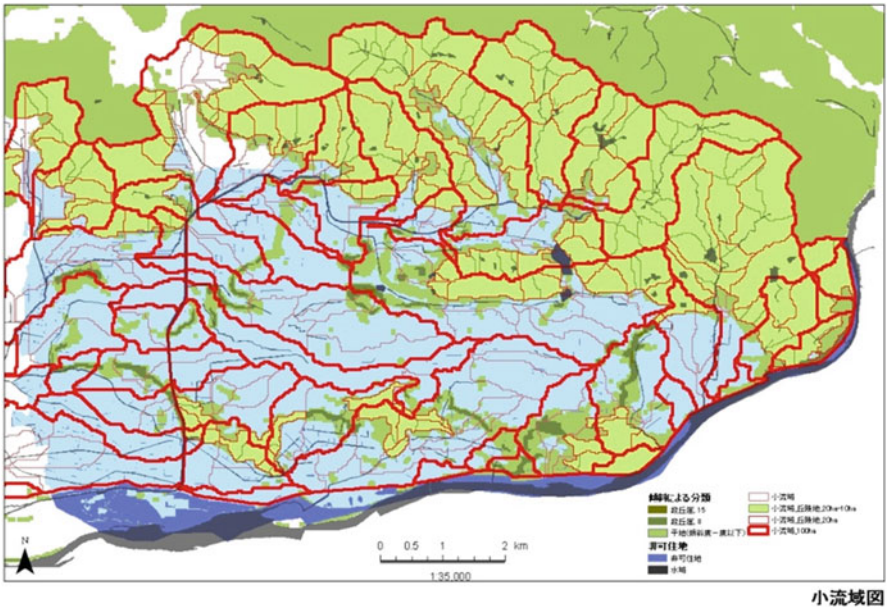

Fig. 3.30 Small watersheds in Kakamigahara City

1. Learning Forest: Crossing point of City and River Corridor
2. Kakamino Natural Heritage Forest: Crossing point of City and River Corridor
3. Meditaion Forest: Crossing point of Forest and River Corridor
4. Old River Trail Park: River Corridor
5. Sky Forest: City Corridor
6. Kakami Forest: Crossing point of City and River Corridor
7. Castle Park: Crossing point of city and River Corridor

3.3.3 Creating Ecological and Cultural Cores of Natural Symbiosis City

3.3.3.1 Learning Forest

The first step for creating natural symbiosis city had started in 2000, for the crossing point of city and river corridor. It was the former site of Gifu Agricultural Collage established in 1920, and became Dept. of Agriculture of Gifu University. However, Gifu University built the new campus and this site was planned to be sold out for residential development. Strong citizen movement occurred, and based on the recommendation from the green and water corridor committee, it was decided to be purchased for the central park of Kakamigahara City. Since there used to be the site of the

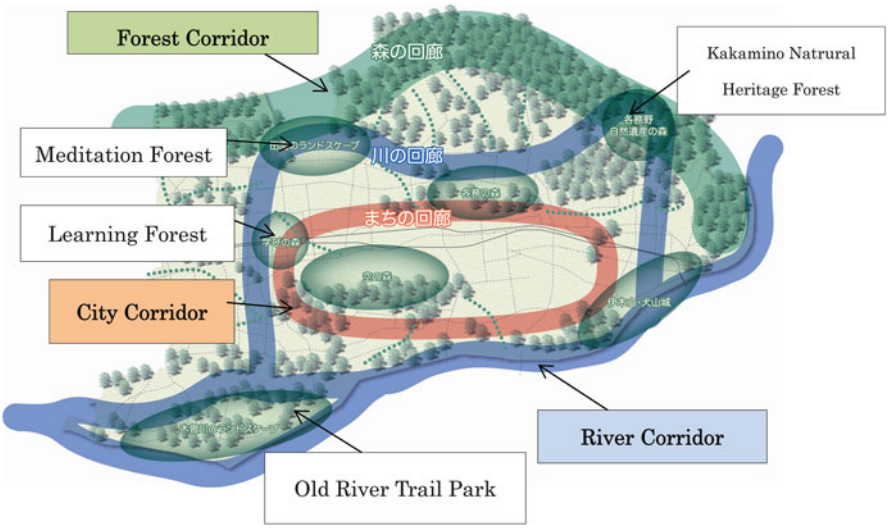

Fig. 3.31 Concept of green and water corridor plan of Kakamigahara City

university, the park was named as Learning Forest. Figure 3.32 is the landscape plan of Learning Forest. We introduced shallow pond and stream for creating networks from Satoyama to the midst of city (Figs. 3.33 and 3.34). Also, we tried to leave open spaces where citizen can play freely. At the adjacent area, school of handicapped children was build without the fence between park and school (Fig. 3.33).

3.3.3.2 Kakamino Natural Heritage Forest

The next step was the restoration of Satoyama. As mentioned above, Satoyama was used to be commons for collecting fire woods. However, because of the energy shift to the oil, it has been abandoned for a long time. The purpose of Kakamino Natural Heritage Park was to enrich the bio diversity of Satoyama as water recharge area of the city. Figure 3.35 is the landscape plan. The characteristics of landscape design was to create eco-tone along water edge. Various design were entroduced to enrich bio diversities. Figure 3.36 is the main reservoir, and Fig. 3.37 is the small water way. We opened up Natural Heritage school as a park center, where children could learn about Satoyama (Fig. 3.38).

3.3.3.3 Old River Trail Park

In the southern part of Kakamigahara City is Kiso River. Historically, there occurred many floods and diverse river ways remained after building the bank in 1960s. The site of Old River Trail Park is the typical area where the old river existed (Figs. 3.39 and

Fig. 3.32 Landscape plan of Learning forest

Fig. 3.33 School connected to Learning forest

Fig. 3.34 Shallow pond and stream in Learning Forest

3.40). It had been abandoned for a long time. We carried out a work shop together with citizen, and develop the comprehensive plan including the neighborhood community (Fig. 3.41).

3.3.3.4 Citizen Participation

Figure 3.42 is the number of Park Ranger since 2002. It is important that the real power of Kakamigahara City is the contribution of citizen for the management of Park City.

3.4 Conclusion

In this chapter, I discussed about the historical characteristics of Landscape planning and design in Japan. We have a long history of gardening since seventh century to the middle nineteenth century. It could be said Era of Culture. After the modernization, Japan had experienced, modern park movement in 1873–1920, park system as a reconstruction in 1930s, regional planning in 1930–1945, economic growth in 1960s, revitalization of urban environment in 1980s, and finally reached to seek for Natural Symbiosis City.

I discuss the methodology of Natural Symbiosis City as a new trend of landscape planning and design, using two examples, one is Tokyo and the other is local city,

Fig. 3.35 Kakamino Natural Heritage Park

Kakamigahara. There are three principals in the methodology of Natural Symbiosis City. The first is to introduce the watershed management as a basic structure, The second is to develop eological network system, and the third is the citizen participation for the activating the plan.

We are facing to solve earth problems and the risk management of huge disasters, such as floods, earthquakes, and tsunami. The new trend of landscape planning and design are now trying to work for these issues for the sustainability of our environment.

Fig. 3.36 Main reservoir in Kakamino Natural Heritage Park

Fig. 3.37 Water way

Fig. 3.38 Kakamino Natural Heritage School

Fig. 3.39 Site before the restoration

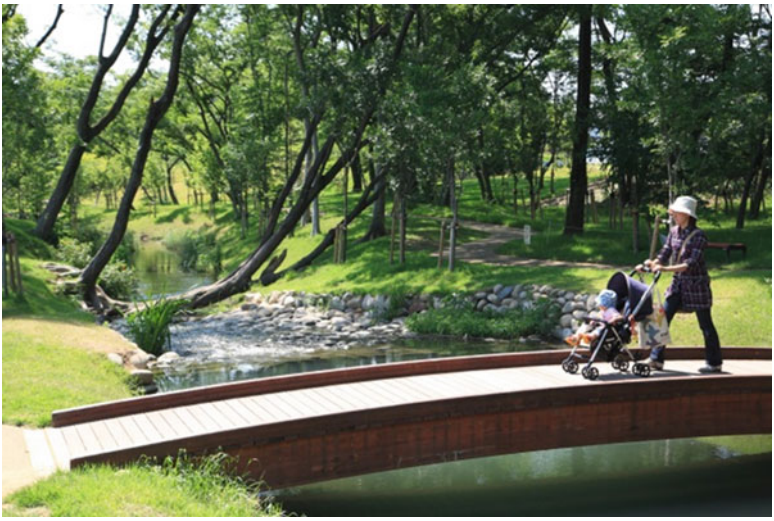

Fig. 3.40 Site after the restoration

Fig. 3.41 Wild bird

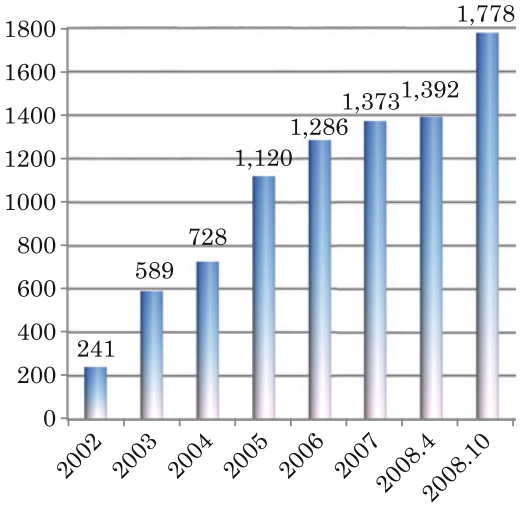

Fig. 3.42 Number of Park Ranger

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Chapter 4
Strategic Practice of Landscape Plan for Development Management with Local Governance in Japan

Hisako Koura

Abstract Landscape Plan is established as the new planning system in Landscape Act of 2004. According to the analysis of the questionnaire research, more than 40 % of Landscape Plans are implemented as the ground of development management with the purpose to conserve and/or generate the local character. As the change of the landscape is coincident with development, landscapes began to be recognized as the key for development management, and vigorous places with good landscape are the results of a continuous interactive process of managing moderation in changes. The three examples of the strategic practices of Landscape Plan are introduced to discuss on its potential to work as the holistic spatial planning for the local government under the condition of the segmented land use planning system in Japan.

Keyword Development management • Landscape Plan • Local character • Sector integration

4.1 "Landscape" Concept

The Japanese words that would be translated as "landscape" in English vary in concept. The concept of "landscape" in the planning field in Japan is often associated with physical settings as an object of conservation (MACHINAMI 1999) or good design of developments, which are to be controlled by regulations and promoted with design guidelines. Thus people considered for long that a "landscape" was something special such as a townscape of a designated historic area or good urban design of well-planned large schemes.

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After the economy started to stagnate in the 1990s, the quality of the ordinary living environment became a matter of public interest. People became aware that a "landscape" reflects the quality of local settings as well as their history and culture, which have been generated by urban activities and their way of living within the local climate and topographical conditions (AIJ 2009). The physical settings usually are examined to set up the regulations of materials, style, colors and other elements of buildings for conservation of the designated historic townscape or to control the design of large schemes. Now, however, a more holistic understanding of local environments is required for the planning of a "landscape" when the quality of the local setting is concerned.

In this context, regarding development management, a "landscape" in the planning field is closely associated with "design" in England, which was developed in the last decade as the key concept to deliver sustainable development by the former Labour government. "By Design" (DETR/CABE 2000)[1] sets out the seven design objectives[2] for good design, which are considered to be facilitated by a strategy that is based on an understanding of a place. They are related to the character and quality of a place that should be promoted by good planning (CABE 2009a, b).

In this paper, landscape signifies the concept of "landscape" in the planning field of Japan, and the system and practices of the Landscape Plan established in the Landscape Act of 2004 are examined in relation to development management for local sustainability.

4.2 Background of Landscape Act 2004

In the 1960s, landscapes first became recognized as a planning issue in Japan when the rapid economic growth together with the developments in the green field and the old urbanized areas brought about the loss of local character in many cities and towns. Some of the local governments, such as Kanazawa and Kurashiki, attached much importance to their tradition and local characters of their places and established ordinances to conserve their historic environments. Responding to these local movements for conservation, a legal system was established and implemented to designate historic townscapes that are academically evaluated as cultural assets and conservation schemes. The conservation of historic environments and scenic beauty are always the main objects of the landscape policy.

[1] "By Design"(DETR/CABE 2000) is the first comprehensive guideline for urban design in a planning system prepared by DETR (Department of Environment, Transport and Region) and CABE (Commission for Architecture and the Built Environment).

[2] Seven objectives to be achieved by design are: to promote "Character", to distinguish a place with "Continuity and enclosure", to improve "Quality of the public realm", and to promote "Ease of movement" (accessibility and local permeability), "Legibility", "Adaptability" and "Diversity" of a place.

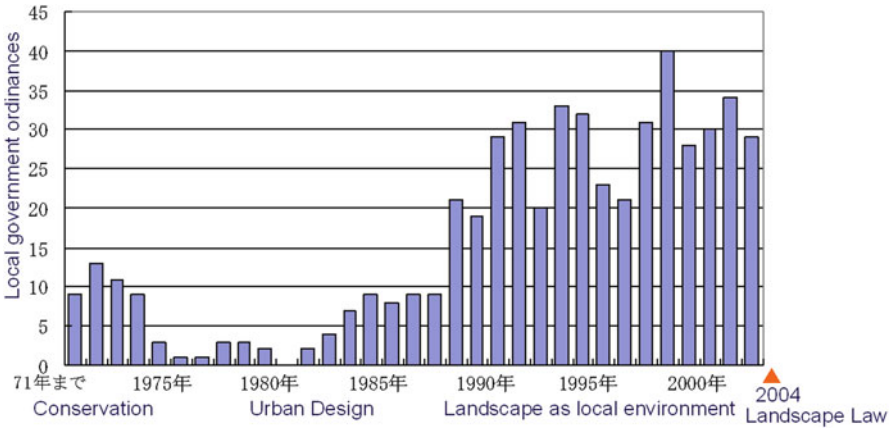

Fig. 4.1 Landscape ordinances

Fig. 4.2 Landscape conflict in the neighborhood

Landscape, however, has been for a long time considered as the issue of local government, and thus various achievements to conserve and create good landscapes have been carried out based on ordinances of local governments. Especially in the 1990s, many of the local governments established landscape ordinances (Fig. 4.1), which corresponded to the movements of community development. After the bubble economy collapsed, development of large condominiums was only a scheme to secure benefits, and their massive volumes and heights in detached-house neighborhoods caused social conflict between developers and neighborhoods (Fig. 4.2). People became concerned about sustainability of local settings when they faced these conflicts.

Even though many such landscape conflicts came out, the zoning system in Japan cannot exclude the possibility of such cases. As the change of the landscape is coincident with development, landscapes began to be recognized as the key for development management. Local governments, however, hardly negotiate with developers, based on the landscape ordinances, to reach effective solutions to make the schemes harmonious with the neighborhood. Most of the developers do not care

about local context and landscape ordinances with little legal force. Thus it is expected that any legal regulatory tool must be provided to prevent uncontrolled large development that makes an impact on the ordinary living environment.

In this context with social interests for the quality of the living environment, the Landscape Act (MILT 2004a) was established in 2004.

4.3 Landscape Plan and Its Key Characteristics

The Landscape Plan is the new planning system established in the Landscape Act of 2004. The local governments that decide on the Landscape Plans are named Landscape Administrative Organizations.

Every Landscape Plan is required to specify (1) planning area, (2) policy for a good landscape, (3) matters of regulations, and (4) designation policy for buildings and structures of landscape importance and that for trees of landscape importance. The Plan also may specify (5) matters concerning outdoor advertisements, (6) matters concerning public facilities for landscape importance, and (7) landscape-oriented agricultural promotion area improvement plan.

According to information from the MLIT,[3] 338 Landscape Plans were decided among 562 Landscape Administrative Organization by August 1st of 2012.

It was learned based on the analysis of the questionnaire research of 2011[4] that the main motivations and purposes to implement Landscape Plans are firstly to generate and reinforce the character of the place (52 %) and to practice more effective control over the large development schemes with legal force (47.6 %) (Fig. 4.3). The expected contribution of the Landscape Plan to the local environment is mainly that the Plan will function as a regulatory tool to manage the impact of large development on the local settings (42.9 %), and secondly is that the conservation and generation of local character will be facilitated (42.5 %) (Fig. 4.4).

A Landscape is, in a sense, the visual attributes of the local environment. The answers of the local governments to the questionnaire research, however, indicate that the local landscape is not understood as just the matter of appearance but it is often associated with land use, development control and community involvement. According to the description of a good landscape in the Landscape Act of 2004,[5] a good landscape is the common property of the people and developed with generation of local character in diversity and produced by the harmony among nature, history, culture, local economy and activities. The concept of landscape is not limited to the matter of physical settings but asks for the comprehensive understanding of a built environment and its cultural, social and economic backgrounds.

[3] MLIT is the Ministry of Land, Infrastructure, Transport and Tourism.

[4] The questionnaire research of 2011 was conducted in August 2011 by Koura Lab of Osaka University, and the questionnaires were sent to 296 Landscape Administrative Organizations and 252 of them answered.

[5] Landscape Act, Chapter I, Article 2 (Basic philosophy) (MILT 2004b).

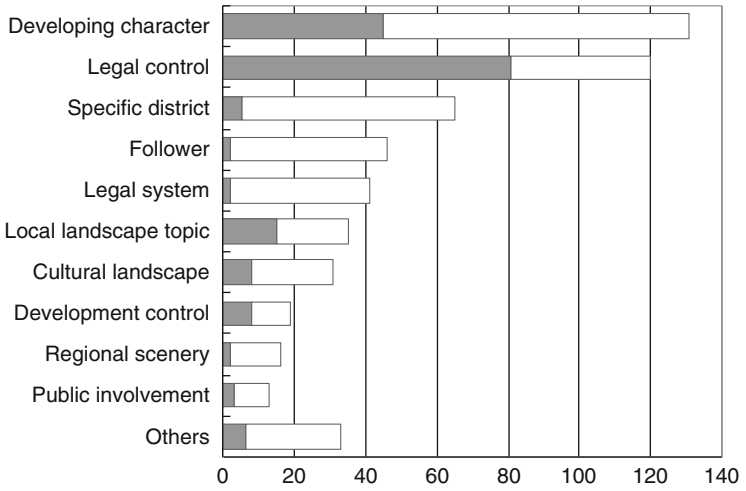

Fig. 4.3 Motivations and purpose to implement Landscape Plan

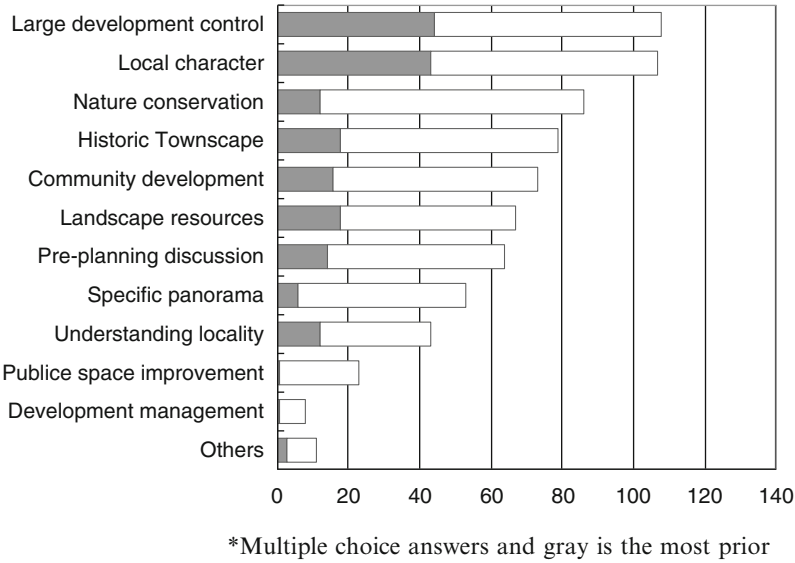

Fig. 4.4 Expected contribution of Landscape Plan

As the planning system to deliver a good landscape, the following are key characteristics of the Landscape Plan:

1. The Landscape Plan can be applied to all the categories of the land use area designated by the National Land Use Plan as explained in the next chapter, and the local government which has no designated area for City Planning Law possibly applies the Plan as the land use plan to control and manage the development to some extent.

2. Qualitative regulations, which prescribe the character of a place and local context of the landscape, are adopted as legal regulations as well as quantitative indicators. The appropriate design solution to meet the qualitative regulation varies in places and building type, while the quantitative restriction, on the contrary, tends to work as a minimum standard (Koura 2010). As a consequence, the effect of the pre-notification discussion on the scheme by the local government is expected to be improved.
3. What are decided and how they are prescribed in the Plan is open to the local government within the legal framework to respond to the local necessity (Koura 2008).

As the planning system of the Landscape Plan provides various options, when the local government takes advantage of these key characters with the clear purpose of implementation and/or spatial vision for the future, various inventions will be developed to meet local necessity.

4.4 Landscape and Land Use in the Planning System

In Japan, all the land in our country is designated as either Nature for preservation, Natural Park, Forestry area, Farmland area, or Urban area[6] by the National Land Use Plan (Fig. 4.5). Each of them is planned and controlled by different legal systems without any linkage and coordination. Only the Landscape Plan could cover all administrative areas disregarding the boundaries of each land use. This is the key characteristic of the Landscape Plan as the planning system.

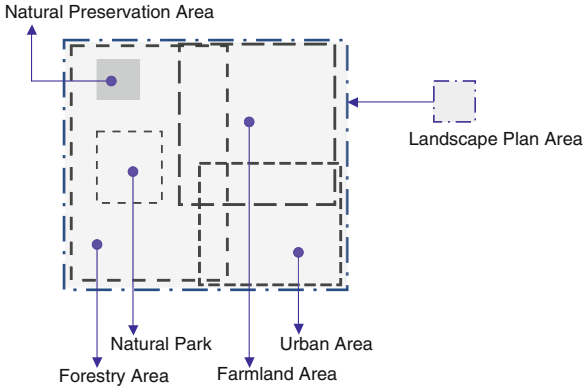

Fig. 4.5 Concept of National Land Use Plan and Landscape Plan

[6] City Planning Law is applied only to Urban Areas designated in the National Land Use Plan.

Landscape has close affinity with land use. In the Landscape Act, the integrated land use is explained as the key to producing "Good Landscape". Article 2 stated as follows; "Good Landscape is produced by the harmony between nature, history, and the culture of the area and people's lifestyles, and economic and other activities, and the efforts shall be made to create and conserve good landscape with the efforts to promote the land use to achieve harmony under proper restraints."[7] Good landscape requires appropriate land use in accordance with local context.

Local land use and geographical features are reflected in the local landscape, and the local character that can be recognized in the landscape is easily accepted as common ground in community development.

Within the Landscape Plan, a policy for a good landscape is another key component of the Plan besides the concept of the planning area that can covers every areas which is segmented by National Land Use Plan. Local government has a free hand to decide what should be prescribed as a policy for good landscape. There are many options that have been created.

Some of the policies for good landscape function as landscape master plans, and others as guidelines to explain the local context and spatial structure of the landscape. Sometimes the policy describes the geographical features and character of a place that often work as the grounds to be relied on for the appraisal of the to-be-notified development in the consultation. When the local government cannot develop a clear vision but would like to handle the legal conference for specified topics or designate the planning procedure, the role of the conference and the planning procedure with community involvement are also able to be prescribed in the policy for a good landscape. Local governments have various options in a way to formulate the Landscape Plan to control and manage developments.

4.5 Strategic Practices of Landscape Plans to Manage Developments

Even though the way of the practice is entrusted to the local government, the Landscape Administrative Organization, they are not always eager for good planning. Some of the unique and strategic practices with specific purposes are worth examining for future reference. Among them, the Plans of Higashikawa, Kamakura, and Azumino are unique in practice focusing on the issue of land use management related to landscape.

The decline of the population and the increase of the aged population ratio reduce the land use intensity, which sometimes allows development at an unpredictable location and scale which causes unexpected impact on the environment. Under this circumstance, some of the local governments, in order to keep the changes under control, attempt to take advantage of the notification procedure, which is required for anyone who commits any act of alteration in the site and buildings and structures as well as

[7] Landscape Act, Chapter I, Article 2 (Basic philosophy).

Fig. 4.6 Developments by small deforestation in Higashikawa

new construction in the planning area of the Landscape Plan. The town and cities above well understand this and put it to practical use for development management.

Three cases of the Higashikawa, Kamakura, and Azumino achievements are introduced to discuss the potential of the Landscape Plan as a development management scheme in Japan.

4.5.1 Case 1: Higashikawa, Hokkaido

Higashikawa is a small town located at the foot of Mt. Asahidake in Hokkaido, and either forestry or farmland covers most of the town area. They have been making an effort to provide design guidelines for countryside housing to increase the sophistication of the local design. Besides promoting this effort to develop the local character, the Landscape Plan is decided and implemented with the intention to manage small deforestation, which is out of the control of the Forest Act regulations (Fig. 4.6).

The Landscape Plan of Higashikawa requires any scheme including deforestation over 50 m^2 to be notified and appraised before it is implemented. This procedure is expected to perform the function of checking the small change in the forest.

In Higashikawa, even very small deforestation causes distinctive alterations in the natural scenery, and at the same time, it possibly affects the underground water.

Fig. 4.7 Diversity of residential area in Kamakura

They did have the experience that uncontrolled small development on the hill affected the quality of underground water, which was very critical as the underground water was used for drinking water. The development management in the forest is an important issue to stabilize water quality along with conservation of scenic beauty. In this town, the quality of the landscape and underground water are linked.

They have no intention to refuse development and deforestation, but any kind of alteration that may affect the underground water must be examined. The Landscape Plan is an available tool for them to provide a solution for this, as far as we do not have a comprehensive and integrated land use planning system, which is available for the local government in Japan.

Development management is the significant potential that a Landscape Plan can contribute.

4.5.2 Case 2: Kamakura, Kanagawa Prefecture

The old capital of Kamakura for a long time acquired a considerable reputation as a good residential area, and there is a great variety within its living environment as to topography, history of urbanization, and other local settings (Fig. 4.7). The land use planning policy in the city planning master plan explains the difference of various

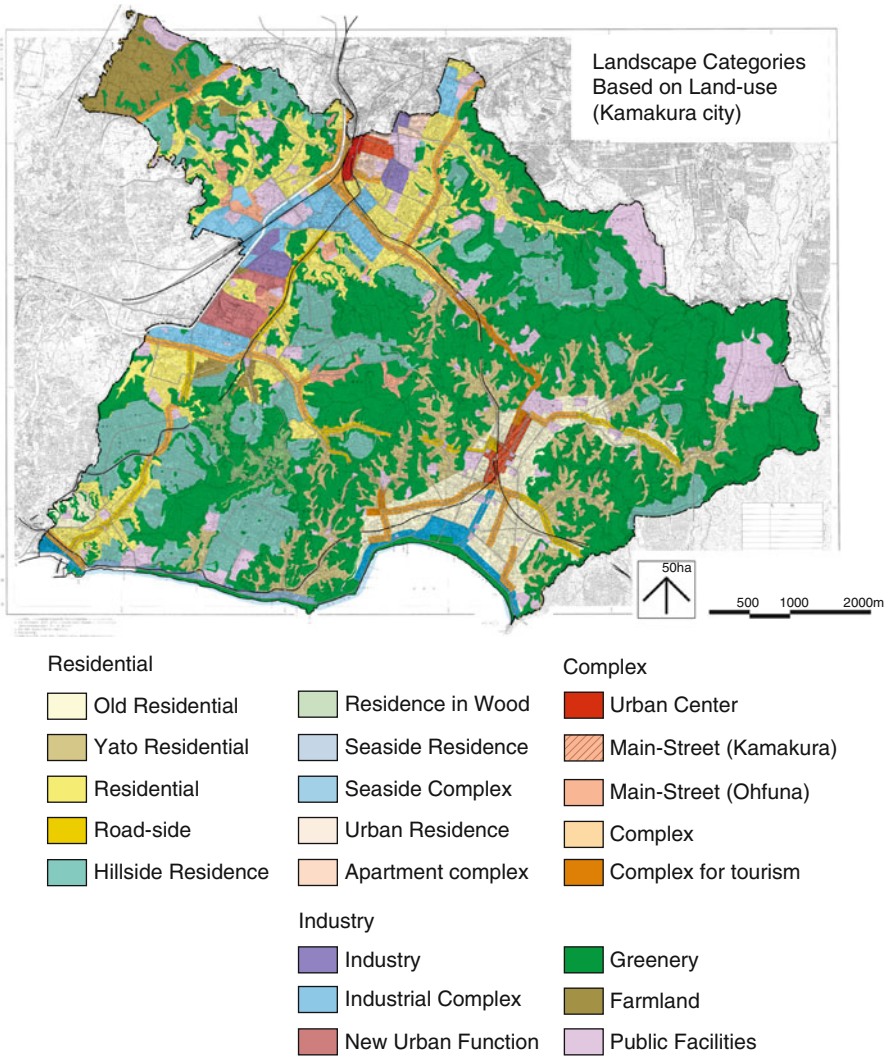

Fig. 4.8 Landscape zones

residential areas as well as other land use categories. In the land use planning policy, 10 different types of residential zones are specified, and other land use categories are two zones for greenery, one for public facilities, one for farming land, two for commercial sites, two for development by the stations, two for industry, one for an urban function, and one for culture and recreation.

In its Landscape Plan, the landscape zones are specified based on land use and landscape characters (Fig. 4.8). These categories of zones and their allocation correspond to the zones indicated as the land-use planning policy. As for the residential area, since a variety of local environments and lifestyles realize a diversity of

landscape, the residential area is categorized into ten zones[8] that are consistent with land use planning policy. They understand that landscape reflects land use.

Conservation and creation of a good landscape is the important objective of the planning policy to retain confidence that the community is a good place to live. They prescribe the policy for a good landscape and matters of regulations individually for each zone with careful consideration to the living manners and housing style, history of urbanization, greenery design, geographical features and some other resources for the landscape.

They set out the prior theme of the landscape in each zone, which describes the character and spatial vision of each zone. The regulations for a good landscape are arranged for three phases with the following purposes;

Phase 1: to promote understanding of the local settings that generate the character of the landscape, with the recommendations for research points.

Phase 2: to check the scheme with minimum restrictions prescribed qualitatively based on the features of a place to avoid the fatal impact and to moderate the change.

Phase 3: to encourage producing a positive proposal for creation of high quality of the living environment to reinforce the character.

This approach originated in the idea that the appropriate management of the change in the local settings would realize the favorable quality of the living environment, which results in a good landscape.

The legal land use zoning system in Japan cannot individually respond to the differences of landscapes that are closely related with land use. The zoning system decides on the building usage, the condition of height control by the width of the access road, and the density and volume by FAR and building coverage of the individual site, but it does not indicate anything about greenery, parking, layout, material and style of roof, balcony and some other typical elements. These are critical for sustainability of local character especially in the residential areas. The zoning system provides six zones for residential areas, which are mostly categorized with volume and density, and thus quality of the residential areas is hardly controlled. In Kamakura, landscape zones correspond to land use planning policy, and the Landscape Plan supplements the legal land use zoning regulation, which is not well fit in the planning policy, for better development management.

4.5.3 Case 3: Azumino, Nagano Prefecture

After the merger of five villages and towns, Azumino city faces the necessity of a new land use policy to coordinate three different legal systems for land use control

[8] Ten zones for residential areas are: (1) old urbanized historic area, (2) Yato Area (Yato: small narrow valley in the hills by erosion), (3) ordinary living area, (4) transportation corridor, (5) hillside area, (6) greenery high quality area, (7) on-shore area, (8) seaside area with small commercial use, (9) urban living area with mixed-use, (10) multifamily dwelling dominant area (planned development area).

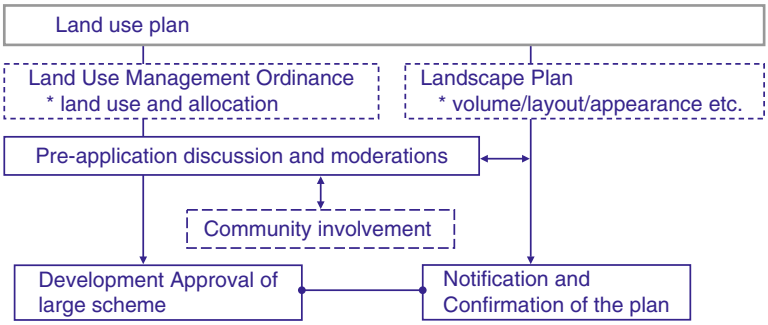

Fig. 4.9 Procedure of development approval in Azumino

which existed before the merger. After a long discussion with community involvement, they decided to establish their own way. Development management of Azumino city is composed of the "Land Use Plan", "Land Use Management Ordinance" and "Landscape Plan".

The Land Use Plan declares the land use policy, and indicates the comprehensive land use concept and zoning for development. The Land Use Management Ordinance provides the legal approval system as the important procedure of development management, and the Landscape Plan takes a role of qualitative regulations for spatial vision. In the process of the approval, public involvement is secured.

In the Landscape Plan, the character of the landscape of Azumino is specified by land use to designate four categories; (1) mountains and Natural Park, (2) forestry and highlands, (3) farmland with small villages and (4) urbanized area. They are in accordance with the zoning of the Land Use Plan. The Landscape Plan is composed of the policy for a good landscape of each characterized area and the qualitative regulation supplemented with guidelines regarding the height and volume, color, layout, appearance, material and greenery coverage. The notification procedure of the Landscape Plan is independent except the large scheme of development that requires approval.

Azumino's land use policy is to control the development locations within the brown field, and existing towns and villages, for the intensive land use. They are ready to accept changes, including some industries, as long as the local character is sustained. Anyone who applies for the approval of a large development scheme are recommended to have a pre-application discussion with the local planning authority before one provides the required neighborhood meeting to explain the scheme, which is open to the public. The planning policy in the Land Use Plan is the basis of development management (Fig. 4.9).

The Landscape Plan, which covers all types of land use areas, is compatible with the Land Use Management Ordinance that is applied to all the city areas that include the area where no land use control by City Planning Law is designated. The Landscape Plan supplements the Land Use Management Ordinance by providing regulatory tools as the legal system.

4.6 Development Management for a Sustainable Local Environment

Changes are inevitable even in the old historic center to meet the present needs of living, and vigorous places with good landscapes are the result of a continuous interactive process of managing moderation in changes.

In Japan, during the period of economic growth, development projects were believed to lead to a better life and the planning system has been modified to promote development. During the recent stagnation of the economy experienced in both urban and rural areas, some developments that unconsciously ignored the local manners of place making disturbed local context of the landscape, and the community became aware of the conflict between development and local sustainability. We have come to need a system of planning that accepts the need to balance conflicting demands.

It is just the recent days in Japan that people accept the necessity of control or appropriate management of development with a comprehensive planning system to deliver sustainable development. Landscape lately has drawn considerable attention because a landscape, as a visual attribute of the place, can be a key to finding the common appraisal of the change in the place.

The Landscape Plan is the only planning system for the local governments that covers all their areas and implementation is left to their decisions according to local need. The close relation between land use and landscape was reviewed in the three examples of strategic practices of Landscape Plans. These practices support the potential of the Landscape Plan as a planning system for development management by delivering a good landscape.

A good landscape cannot be achieved only by regulations and standardization but with understanding of the local context in the land use and living environment (Koura 2009). Regulations in the Plan should be understood with their meaning and backgrounds, and policies for a good landscape should be a story of a place. The Landscape Plan supports the people to communicate with a place. From this viewpoint, landscape literacy will be an important ability, in order to acquire common understanding of local spatial structures and to develop a local value concept to appraise the landscape of a place. It is critical to have local value of landscape in common when we deal with conflicts and moderate the impact of changes in a place. Within this process, the role of planning is more than regulations.

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Part III
Case Studies

Chapter 5
Landscape Perception of Residents in the Nyu Village, Kushida-River—Including Proposal of a *Satochi-Satoyama* Connecting Zone

Hiroyuki Shimizu and Chiaki Nakatsuji

Abstract Japan has a convex form with high mountains in the center. After the Jomon ocean transgression which peaked 6,000 years ago, the ocean began to retreat and has formed plains on which the majority of the Japanese population lives now. In the first part of this paper, We will present geographical features mainly through the analysis of the average land gradient and propose a concept of a satochi-satoyama connecting zone. The concept of a satochi-satoyama connecting zone is useful for overviewing significant connections between nature and human activities. In landscape planning, watershed analysis can well describe a vertical structure from upstream to downstream. On the other hand, analysis of a satochi-satoyama connecting zone can describe horizontal connection of landscape.

In the second part, We will present the results of a questionnaire survey conducted during summer 2012 in Nyu Village, which is located in a satochi-satoyama connecting zone in Mie prefecture. This survey can show how people in Nyu recognize and live with the nature around them. People living in Nyu have very high awareness of the environment and continuously try to improve it. But environmental threats such as harm from animals, lack of maintenance of forests and agricultural lands and loss of economic functions of forests and farmland are structural problems, which cannot be solved only by their own efforts. Some effective political measures in a regional scale might be integrated to such residential efforts. For integrating such measures, the recognition of a satochi-satoyama connecting zone integrated with watershed planning might be useful to develop wide area viewpoints.

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Keywords Awareness of environment • Land use • Landscape perception • Landscape planning • Satochi-satoyama connecting zone • Watershed planning

5.1 Introduction

Japan has a convex form with high mountains in the center. After the Jomon ocean transgression which peaked 6,000 years ago, the ocean began to retreat and has formed plains on which the majority of the Japanese population lives now. Typical plains are the Kanto plain around Tokyo, the Osaka plain around Osaka and the Ise-Nobi-Mikawa plain around Nagoya.

In the first part of this paper, We will present geographical features mainly through the analysis of the average land gradient and propose a concept of a *satochi-satoyama* connecting zone. Through this concept we can more closely observe the human-nature relations in the wide area beyond administrative districts, municipalities or watersheds.

In the second part, We will present the results of a questionnaire survey conducted during summer 2012 in Nyu Village, which is located in a *satochi-satoyama* connecting zone in Mie prefecture. This survey can show how people in Nyu recognize and live with the nature around them. With these two opposite approaches, we will try to describe the issues of the landscape in the rural area in which human activities and nature are directly confronting each other.

5.2 Analysis of Land Gradient and Proposal of *Satochi-Satoyama* Connecting Zone

5.2.1 Calculation of Average Land Gradient of 1 km Radius

The average land gradient of 1 km radius is calculated using the ArcGIS focal statistics function (Fig. 5.1) (Geospatial Information Authority of Japan 2012)[1]. We can clearly recognize that Japan is a mountainous country with steep slopes. Forty-nine percent of the land is covered by slopes steeper than 20°.

Figure 5.2 illustrates the distribution pattern of the average land gradient of 1 km radius in central Japan. We can see clearly that areas of an average land gradient of 3–20° form ring zones around flat lands. Flatlands of less than 3° mostly overlap with alluvial plains. I will focus on this ring zone in the following analysis.

5.2.2 Relationship Between Average Land Gradient, Land Use and Vegetation

Figure 5.3 shows the relationship between the average land gradient and the land use (National Land Numerical Information Download Service 2012) of Japan.

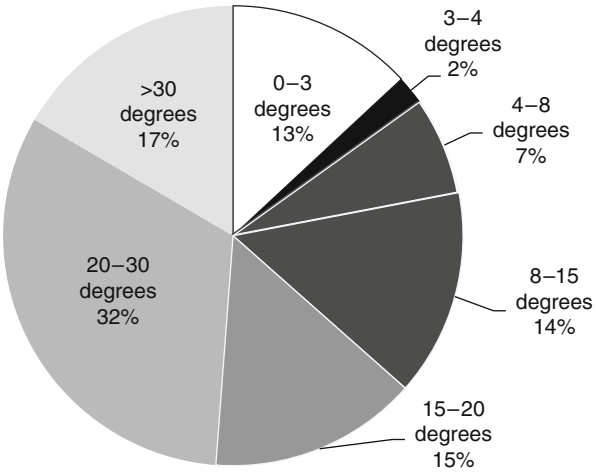


Fig. 5.1 Average land gradient of 1 km radius of Japan

The area with a land gradient over 20° is mostly occupied by forests. On the contrary, in the area with a land gradient less than 3°, urban land use and agricultural land use are dominant. Forests account for only a small percentage. The area with a land gradient of between 3° and 20° constitutes the transitional zone from urban and agricultural areas to mountainous forest areas.

The Biodiversity Center of Japan (2013) provides the digital vegetation data including the natural degree of vegetation. Figure 5.4 and Table 5.1 show the relationship between the average land gradient and the natural degree of Japanese vegetation. The built up land/developed land and the farmland (paddy and other fields)/residential land with rich green occupied 79 % of the area with an average land gradient of between 0° and 3°. As the land gradient becomes steeper, the naturalness of vegetation becomes higher. In the area with an average land gradient of over 20°, the proportion of the lands with strong human activities such as built up/developed land and farmland is small.

Considering the relationship between land gradient, land use and the natural degree of vegetation, we can call the zones with an average land gradient between 3° and 20° the transitional zones between strong human activities and nature.

These transitional zones have distinctive characteristics as follows.

1. There are sloped landscapes with green in the hillsides and hilltops, and rural residential areas and agricultural areas in valleys and alluvial fans.
2. The green in hillsides and hilltops mainly consists of secondary forests strongly affected by human activities.
3. As the land gradient increases, the influences of human activities are reduced.

These zones account for 38 % of Japan and create a typical landscape with the relationship between human activities and nature. This landscape has been cultivated through several thousand years and has been developing the strong potential

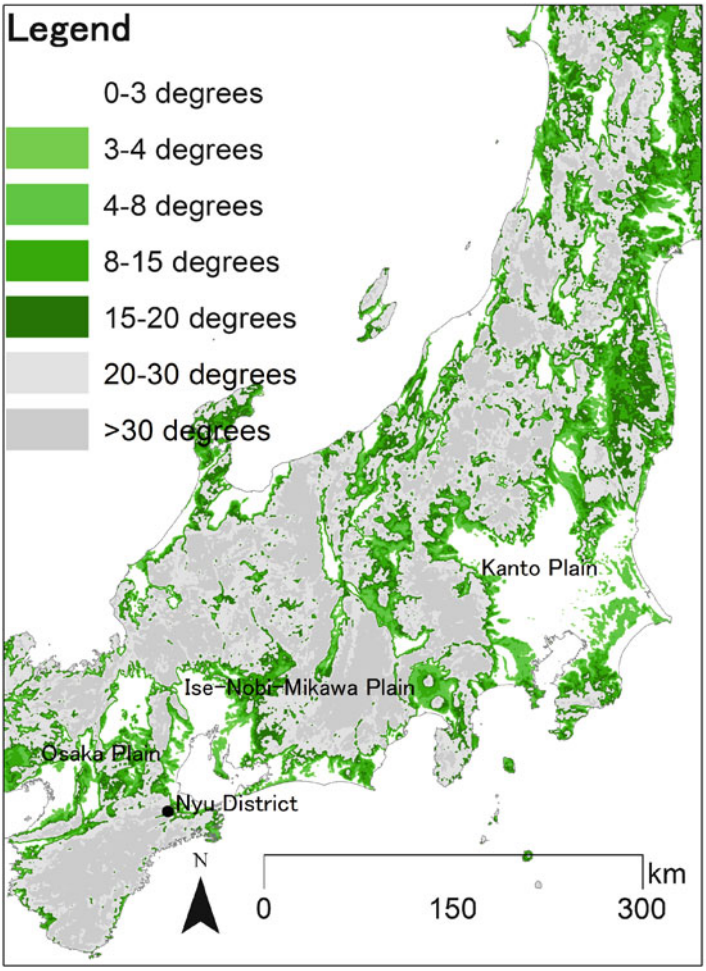


Fig. 5.2 Distribution pattern of average land gradient of 1 km radius in central Japan

of sustainability and biodiversity. We use the word "Satoyama" to represent the characteristic of this kind of area.

The word "satoyama" was introduced by Tsunahide Shidei in the early 1960s and is now used as a "natural environment that is being managed and, therefore, its basic element can be represented as secondary nature." Takeuchi also introduced the word "Satochi" as the landscape comprised of *satoyama*, farmlands, settlements and reservoirs (Takeuchi 2003). The Ministry of the Environment designates this landscape as *satochi-satoyama* landscape instead of *satochi*, and is promoting global attention in this area because this kind of landscape could have rich biodiversities.

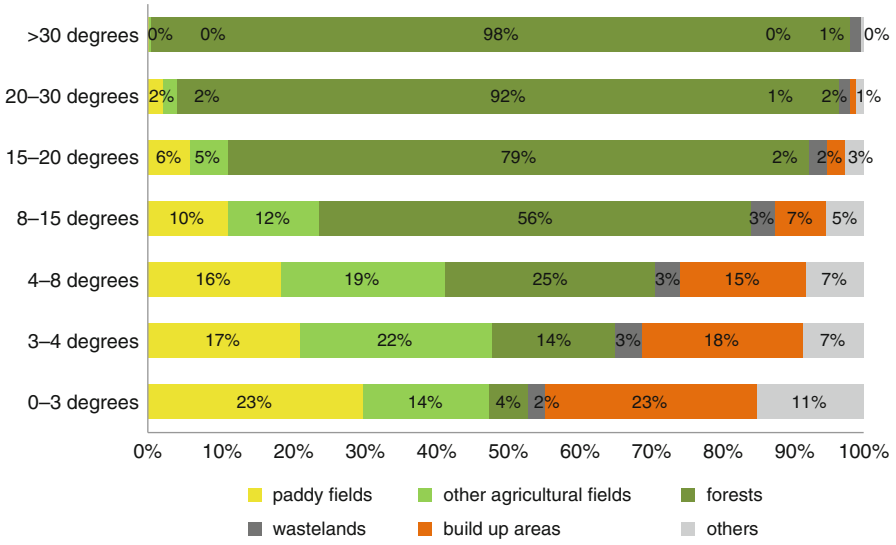


Fig. 5.3 Land use and average land gradient in Japan

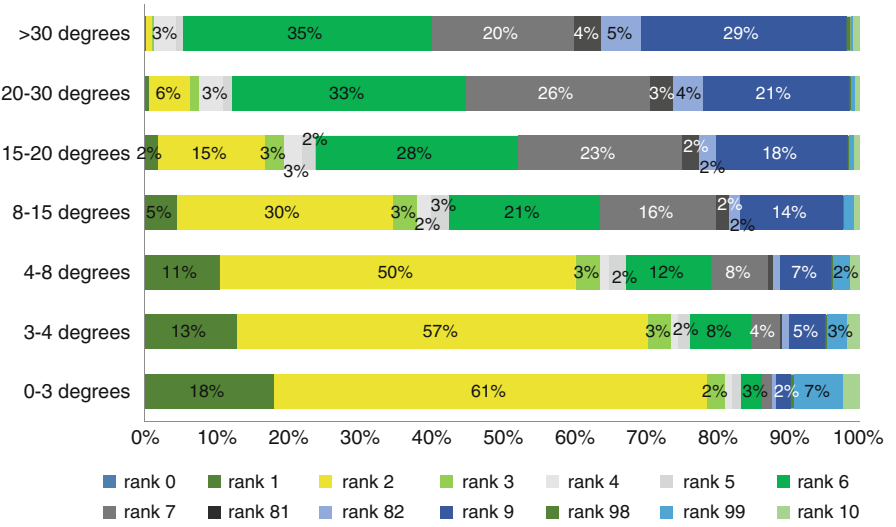


Fig. 5.4 Natural degree of vegetation and land gradient in Japan

We will use the word *satochi-satoyama* as representing the whole complex of the *satoyama* landscape. As a consequence, a *satochi-satoyama* connecting zone can be defined as the horizontal connection of the *satochi-satoyama* zone calculated by using a digital elevation dataset.

Table 5.1 Natural degree of vegetation

Natural degree of vegetation by biodiversity center of Japan	
0	Unknown
1	Built up and developed land
2	Farmland (paddy and other field) and residential land with rich greens
3	Farmland (orchard)
4	Secondary grassland with row short grass
5	Secondary grassland with long grass
6	Plantation
7	Secondary forest
81	Natural near secondary coppice forest (chinquapin, oak)
82	Natural near secondary coppice forest (others)
9	Natural forest
98	Natural bare land
99	Open water
10	Natural grassland

5.2.3 Satochi-Satoyama Landscape and Satochi-Satoyama Connecting Zone

In recent years *satochi-satoyama* landscapes have been confronting difficult issues on their sustainability as follows.

1. The fuel and fertilizer revolution in modern times has changed the relationship between human beings and nature. Secondary forests have lost the role of providing fuel and fertilizer in daily life, and the relationship between forests and human activities has been broken. As a consequence, forests are abandoned without human care.
2. The secondary forest and the aging in these areas are progressing rapidly and sustainability will be decreasing in the future.

How *satochi-satoyama* landscapes can be revitalized and be made more sustainable in the future has become a big issue.

There is no consensus on the definition and size of *satoyama* (Tsunekawa 2003). Tsunekawa calculated the area of *satoyama* by combined usage of the natural degree of vegetation dataset of the 4th National Survey on the Natural Environment in 1993 and 1994, and the designation of flatland, *satoyama* land and mountainous land used in the Basic Environmental Law (2013). The other estimation has been done by the Ministry of the Environment (2013). Both estimations depended on the vegetation data. Also, the estimation is mainly made for the *satoyama* area as secondary forests and its surroundings and not for the spatial connectivity of the *satochi-satoyama* area.

In this paper we will propose another definition and estimation for the *satochi-satoyama* area. As mentioned above, the average land gradient of 1 km radius can clearly show the transitional zone between nature and human activities, and can be called the *satochi-satoyama* connecting zone. This definition is very simple because of its simple usage of a land elevation dataset. Land use and vegetation datasets, which will change year by year, can be treated as variables. This is the advantage of this definition and can be used in harmony with the concept of a watershed which is also depending only on the land elevation dataset.

5.2.4 Satochi Satoyama Connecting Zone and Watersheds Zone Planning

Figure 5.5 shows the relationship between the average land gradient and watersheds in the Ise Bay bioregion. The *satochi-satoyama* connection zone extends across watersheds at the edge of the Ise-Nobi-Mikawa plain. Watershed zone planning proposed by Ishikawa et al. (2005) is a very important concept for extended landscape planning and management beyond administrative districts or municipalities.

The proposal of a *satochi-satoyama* connecting zone is intended to supplement the watershed zone planning. Watershed zone planning is suitable for considering vertical connection of landscape alongside rivers. Otherwise, the *satochi-satoyama* connecting zone can provide connective vision across watersheds. Watersheds are normally lined up in parallel. An effective landscape planning concept is needed to connect them horizontally. A *satochi-satoyama* connecting zone can provide a good perspective for this purpose.

The allocation of a *satochi-satoyama* connecting zone in the Ise Bay bioregion shows that a *satochi-satoyama* connecting zone can make a clear vision of the important horizontal connection of the edge between the area with strong human activities and the forest area with rich nature.

Figure 5.6 shows the relationship between a *satochi-satoyama* connecting zone and land use in the Ise Bay bioregion.

We can see very clearly that in the Ise Bay bioregion, a *satochi-satoyama* connecting zone forms an edge and a transitional zone between lands under strong human activities and mountainous forest lands.

In Fig. 5.7, the relation between vegetation and the *satochi-satoyama* connecting zone is depicted. We can see that a *satochi-satoyama* connecting zone forms an edge between built up land/developed land/farm land and forest land.

After World War II, lifestyles and the structure of energy consumption in Japan significantly changed. Daily usage of grass and shrubs for energy and construction material has decreased sharply. As the consequence, many grasslands and shrubs have disappeared (Ogura 2012). Recovery of wasted grassland and shrubs in *satochi-satoyama* connecting zones is also a very important issue for Japanese landscape planning.

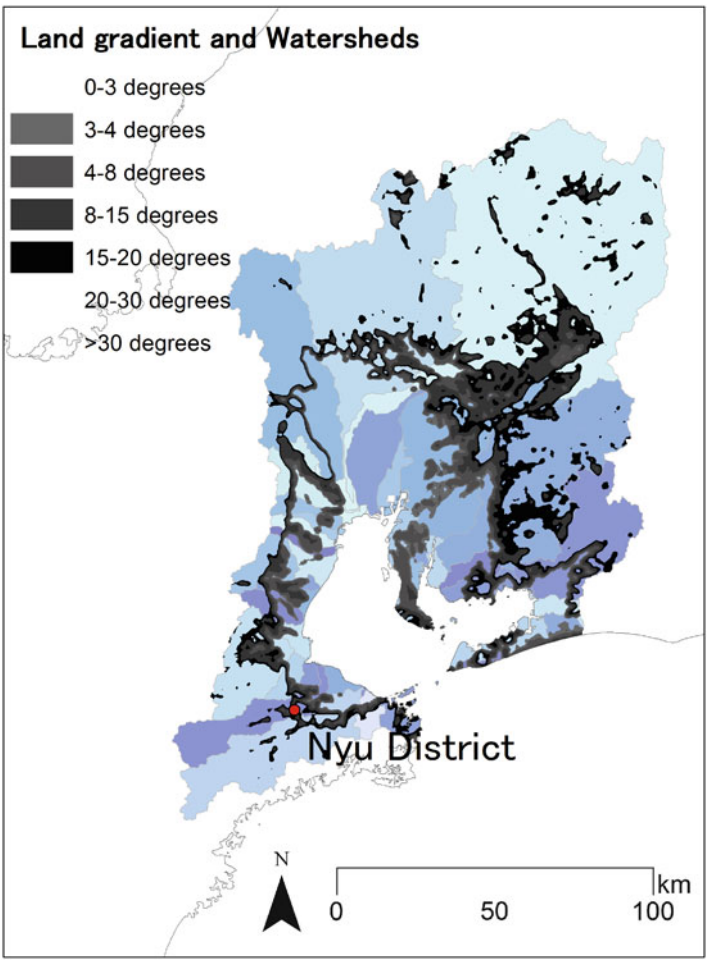


Fig. 5.5 Watersheds and land gradient in Ise Bay bioregion

5.3 How Do People Recognize the Nature in Nyu and Feel Anxieties?

5.3.1 Nyu District as an Example of a Satochi-Satoyama Landscape

Satochi-satoyama has a special character and its biodiversity can be increased by continuous human management (Washitani 2003). This management must be done not only by the public bodies, but also by the hand of the residents themselves.

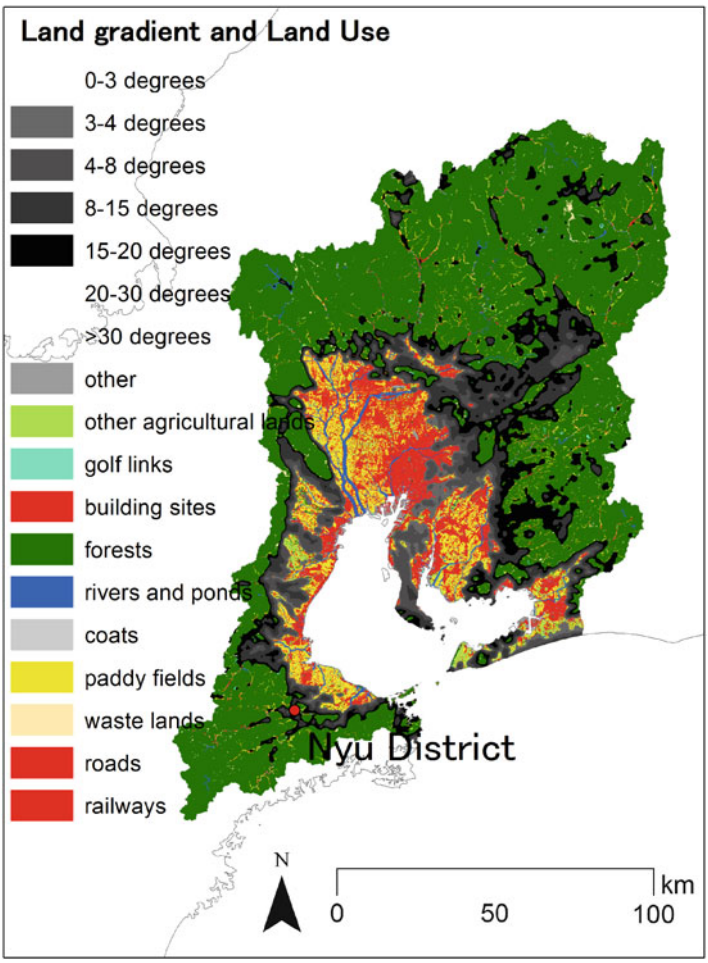


Fig. 5.6 Land use and land gradient in Ise Bay bioregion

The quality of the management depends deeply on people's awareness of nature and eco-systems on-site.

Nyu developed in ancient times to accommodate those working in mercury mines. The town also flourished as a post town for travel to Ise Shrine. But the mercury industry was diminished in the early period. Nowadays, Nyu has also deviated from the main road network and has lost its commercial function as a post town.

The population of Nyu is 1,045 and 351 families are living in the district.

The *satochi-satoyama* landscape in Nyu is in danger of poor management because of population decline. But the residents have a strong awareness of their environment and have made much effort for its conservation.

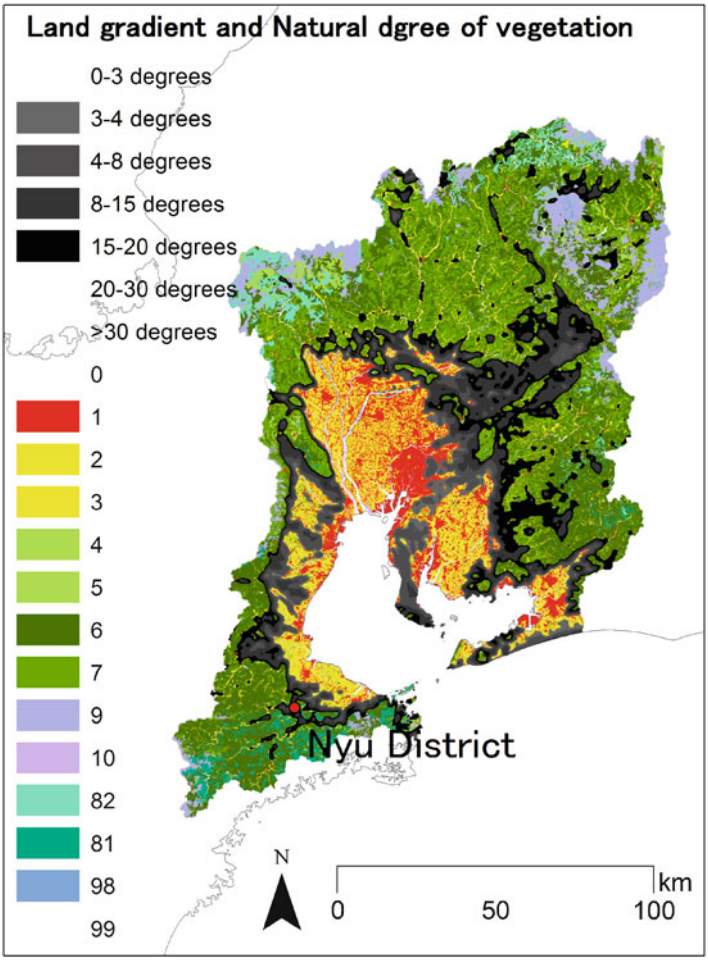


Fig. 5.7 National degree of vegetation and land gradient in Ise Bay bioregion

In Fig. 5.8a (Bing Maps Aerial 2013), an aerial view of Nyu is shown. Nyu district is located in the *satochi-satoyama* connecting zone of the Ise Bay bioregion. It is located within the Kushida river basin and a little outside of an urban area but in the agricultural area under the control of the administrative authority of Mie Prefecture.

The small residential areas are surrounded by agricultural fields, mainly paddy fields, and gently sloped forests, which form the typical *satochi-satoyama* landscape (Fig. 5.8b).

In Fig. 5.8c, the vegetation map of the area around Nyu is shown. We can see that the residential area is surrounded by a conifer plantation, beech-oak coppice forest, a pine plantation and a mulberry field. Figure 5.8d shows the natural degree of vegetation around Nyu. The natural degrees of the forests around Nyu are mostly

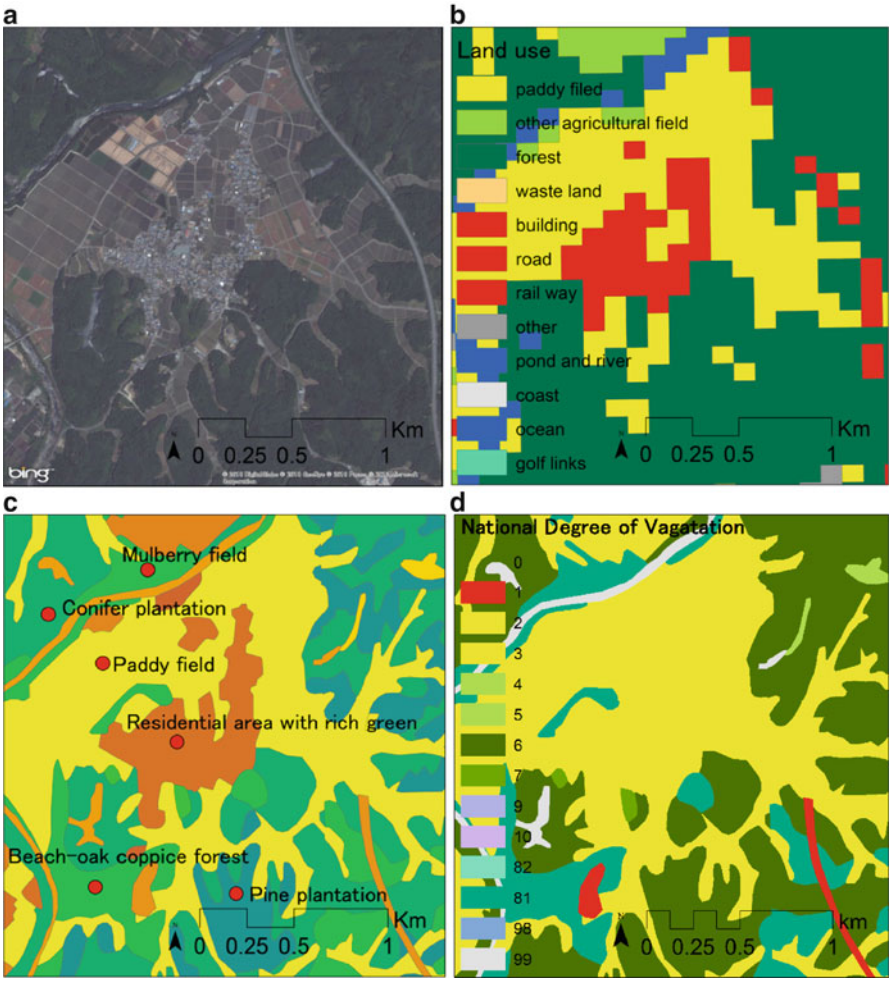


Fig. 5.8 (**a**) Aerial view of Nyu. (**b**) Land use of Nyu. (**c**) Vegetation of Nyu. (**d**) Natural degree of vegetation Nyu

7 and 8–1. These facts on the vegetation map and the natural vegetation degree map indicate that the forests around Nyu are cultivated secondary forests which must be maintained by human activities.

Nyu has several historical heritage sites. One is Nyu Daishi temple (Fig. 5.9) established in 774 by Kinso Daitoku, the teacher of Kobo Daishi, a very famous Buddhist priest. Kobo Daishi visited the area in 813 and completed the temple allocation. He had a sense of civil engineering and mining. In the medieval period this area became very famous for its mercury mine.

Nyu also flourished as a post town for travelers to Ise Shrine, which is the most important shrine in Japan. In modern times, the importance of a transportation node

Fig. 5.9 Nyu Daishi temple

Fig. 5.10 Traditional residential housing

has been lost for a long time because of the introduction of railways and automobiles. But many rich traditional residential houses still remain alongside the old travel road (Fig. 5.10). However, population decline has increased the number of vacant houses alongside the old streets.

Attachment of the people to the landscape is very strong. They have tried for a long time to maintain the beautiful landscape by efforts such as planting hydrangea along small irrigation canals and ribbings of paddy fields. Small irrigation canals established years ago are also part of the important cultural landscape of Nyu (Fig. 5.11).

In the forest area adjacent directly to farmland, there are many abandoned bamboo groves. Bamboo is growing rapidly, and the aging local population cannot stop its spreading. Also recently the amount of deer and wild pigs are increasing, and there is frequent damage caused by them.

Fig. 5.11 Hydrangea plantation by the hand of the residents

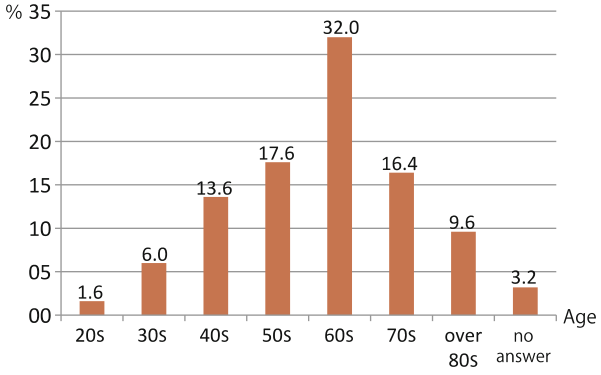


Fig. 5.12 Age distribution of the respondents

5.3.2 Willingness and Anxiety to Continue to Live in Nyu

Now we present the results of the questionnaire survey. The questionnaires were sent to almost all 293 households. The return rate was very high at 85 %. Figure 5.12 shows the age distribution of the respondents. The number of respondents over 60 accounts for 58 %, which indicates the aging community of the area.

Figure 5.13a shows the attachment of the residents to Nyu, which is very strong. Figure 5.13b is the satisfaction on several items. The items with high satisfaction are the natural environment around Nyu, the connection with friends and the attachment to the family. On the contrary, the items with low satisfaction are the work in Nyu and the general life of Nyu. Many people have anxiety to continue to live in Nyu (Fig. 5.13c).

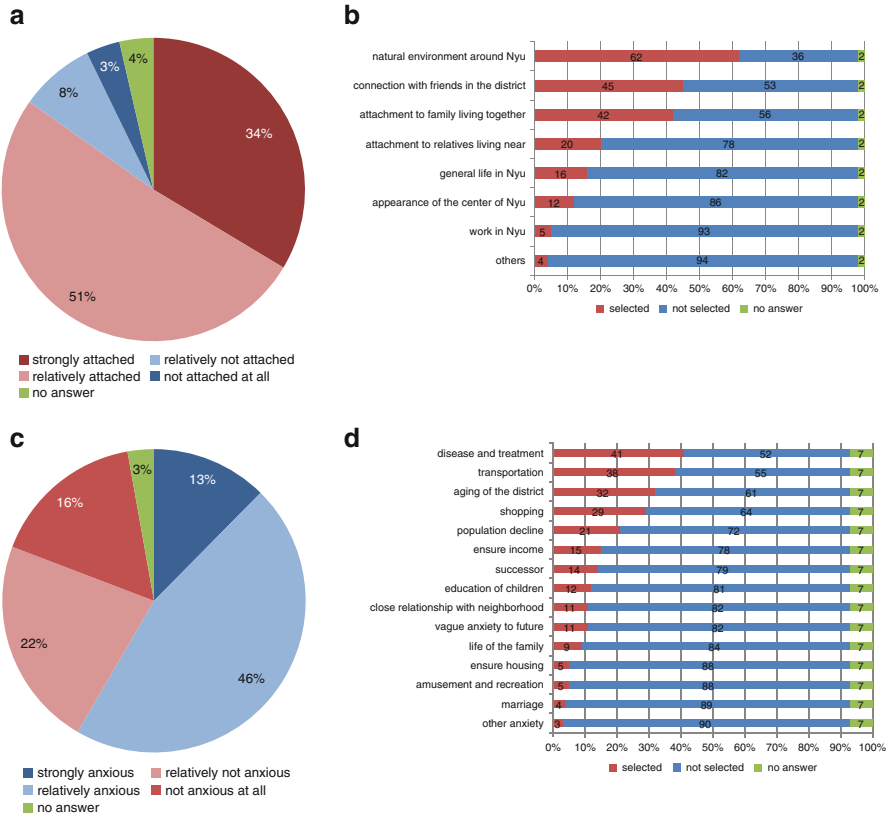


Fig. 5.13 (**a**) Attachment to Nyu. (**b**) Satisfaction items. (**c**) Anxiety to continue to live in Nyu. (**d**) Anxiety to live in Nyu

Items associated with high anxiety are those regarding disease and medical treatment, transportation, aging of the district, shopping and population decline. Items not significantly contributing to anxiety are amusement and recreation, availability of housing and marriage (Fig. 5.13d).

5.3.3 Awareness of Landscape in Nyu

Most of the people agree about the aesthetic values of the landscape in Nyu (Fig. 5.14a). There are many small canals in and around the residential area and farmlands, which make the landscape of Nyu beautiful. Most of the residents recognize the presence of canals around their houses and are aware of the beauty of the waterscape with canals (Fig. 5.14b, c).

Because of the demographic change and shrinking society, there are many abandoned forests and farmlands, and vacant houses. The residents have a strong awareness

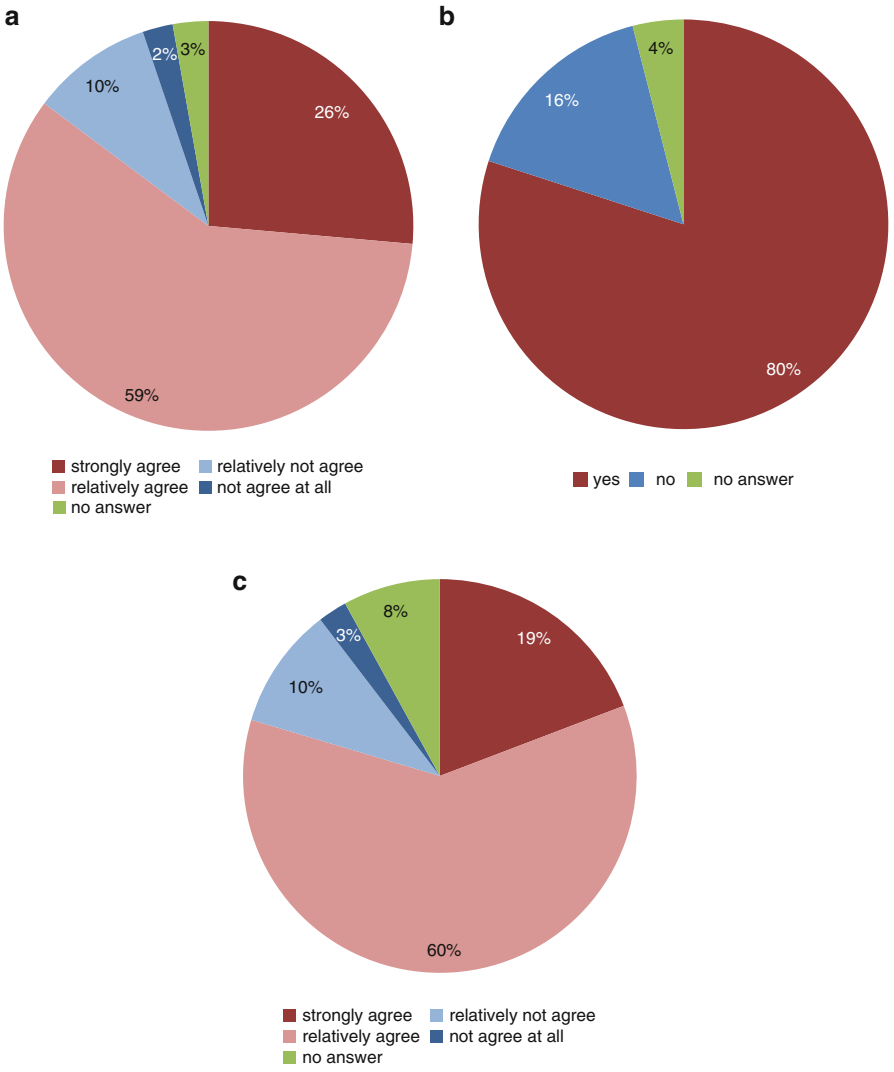


Fig. 5.14 (**a**) Beautifulness waterscape in Nyu. (**b**) Presence of small canal around house. (**c**) Beautifulness of small canals in Nyu

of the situation, especially of lack of forest management and vacant houses. People want the vacant houses to be used rather than to remain vacant (Fig. 5.15a–d).

Sixty-five and seventy-one percent of the respondents own their own forests and farmlands respectively. The privately owned forests and farmlands are located relatively near their residences. They frequently use their own farmland but rarely use their own forests. They feel the difficulties such as lack of daily maintenance, low or no income and expansion of bamboo groves on their own forests, and low or

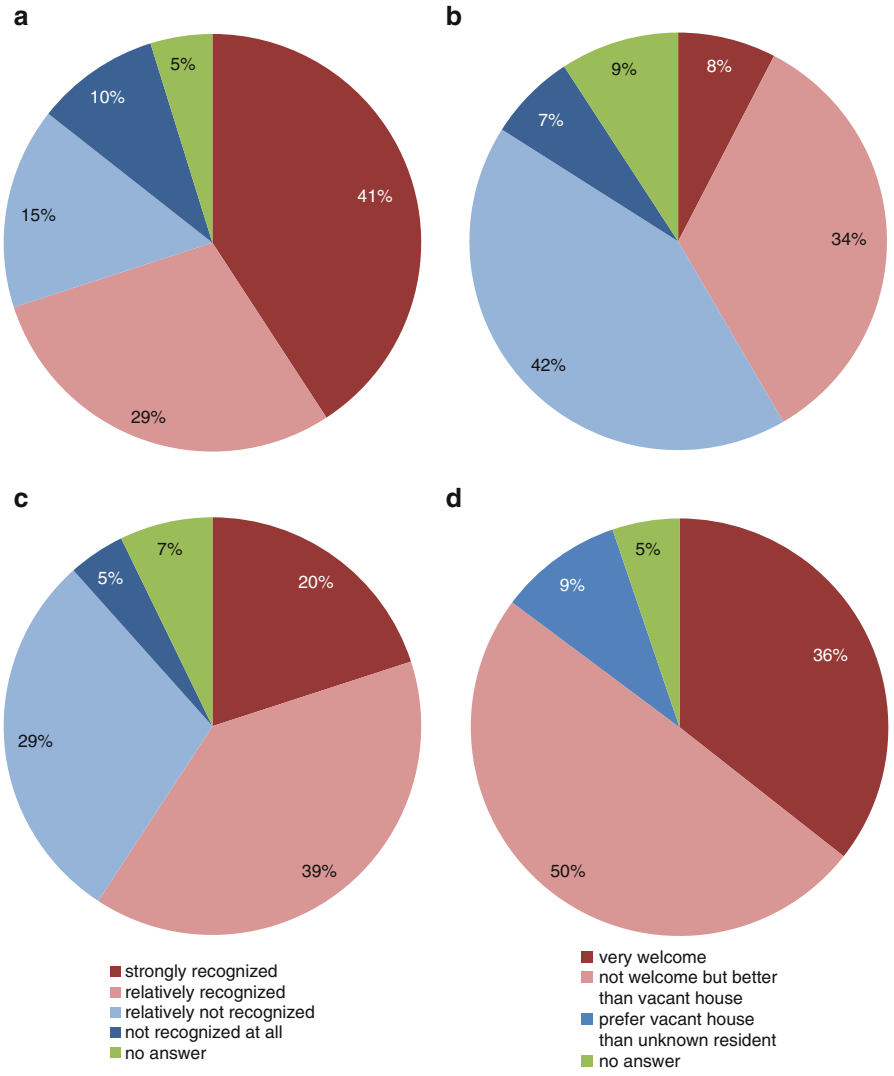


Fig. 5.15 (**a**) Lack of forest. (**b**) Abandoned farmland. (**c**) Vacant houses. (**d**) Opinion to inflows of new residents

no income and lack of daily maintenance on their own farmlands (Fig. 5.16a–h). These difficulties seem to form a structural problem on sustainability in a shrinking district such as Nyu.

Green growth is planted in 71 % or more of private gardens (Fig. 5.17a). Also, almost half of the people prefer caring for their own garden trees. But there is also a significant number of people who don't want it, even though they themselves own trees (Fig. 5.17b). This fact indicates that by introduction of green in a district, we must always take landscape planning into account, as well as who should or will care for them.

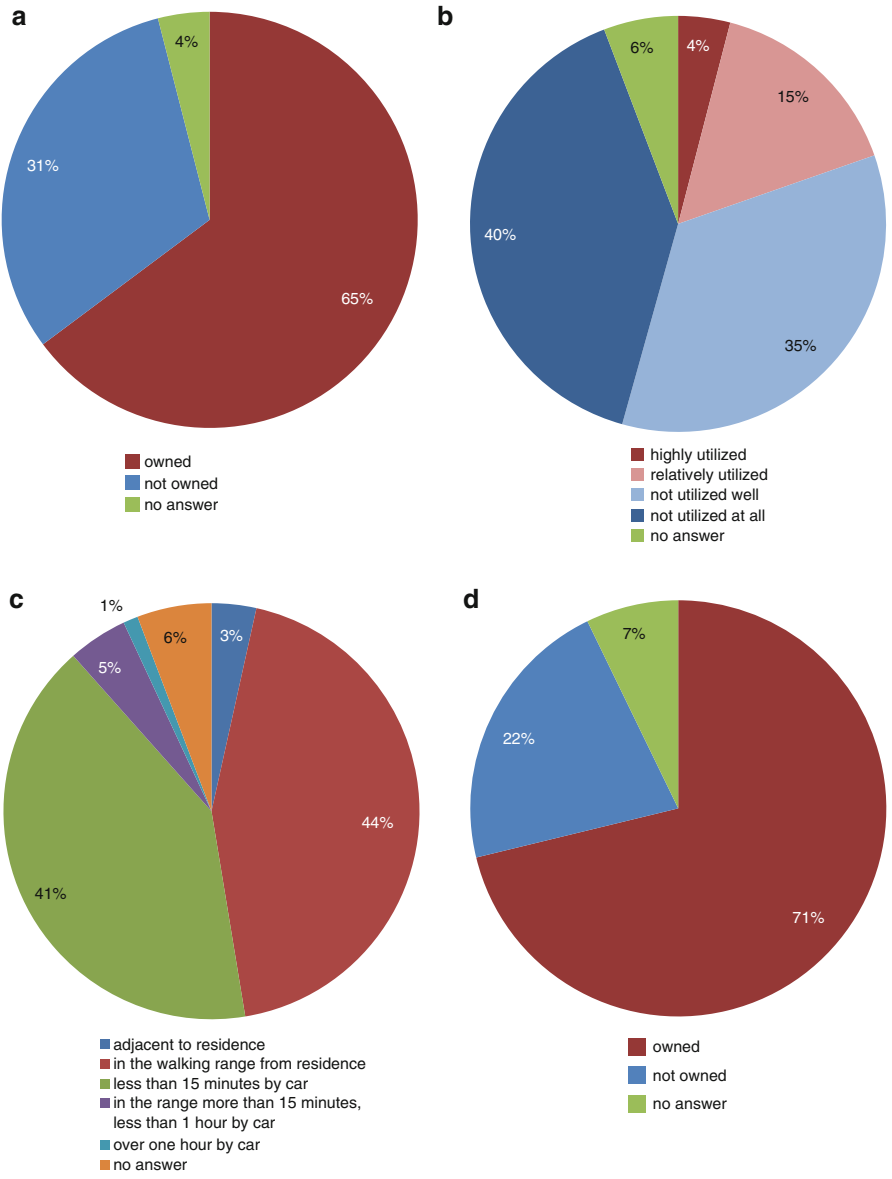


Fig. 5.16 (**a**) Ownership of forest. (**b**) Use of owned forest. (**c**) Distance of the owned forest from the residence. (**d**) Ownership of farmlands. (**e**) Use of owned farmlands. (**f**) Distance of the owned farmlands from the residence. (**g**) Difficulties of owned forest. (**h**) Difficulties of owned farmlands

In Fig. 5.18a, recognition of the owners/non-owners of forest to bamboo expansion, lack of forest management, ecosystems in paddy fields, ecosystems in grasslands, insects and small animals in the forest and large animals in the forest are shown respectively. The recognition of these phenomena by the owners is higher than that

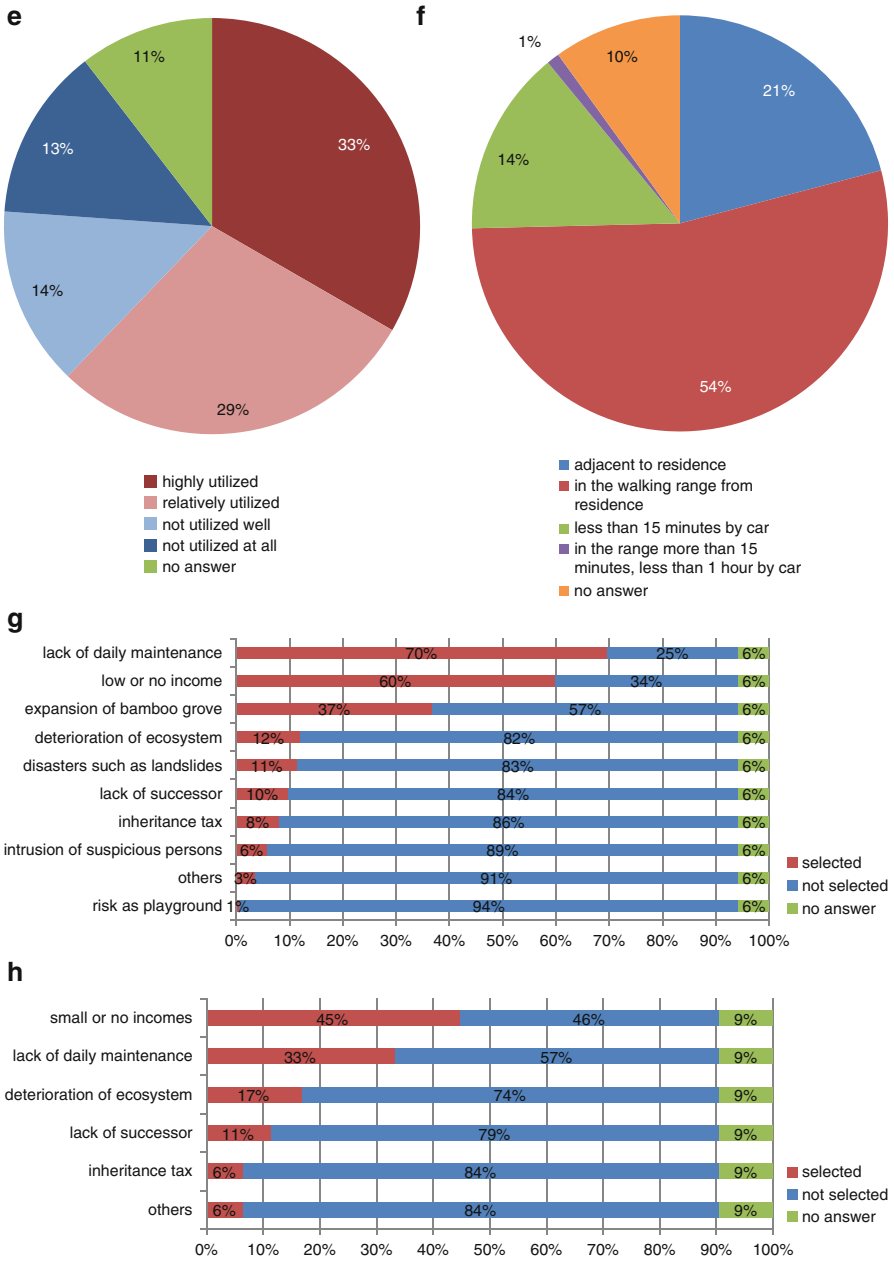


Fig. 5.16 (continued)

of the non-owners. Especially the recognition of the owners to the lack of forest management is very high compared to that of the non-owners. Figure 5.18b shows the recognition of the owners/non-owners of farmlands to bamboo expansion, lack of forest management, ecosystem in paddy fields, ecosystem in grassland, insects

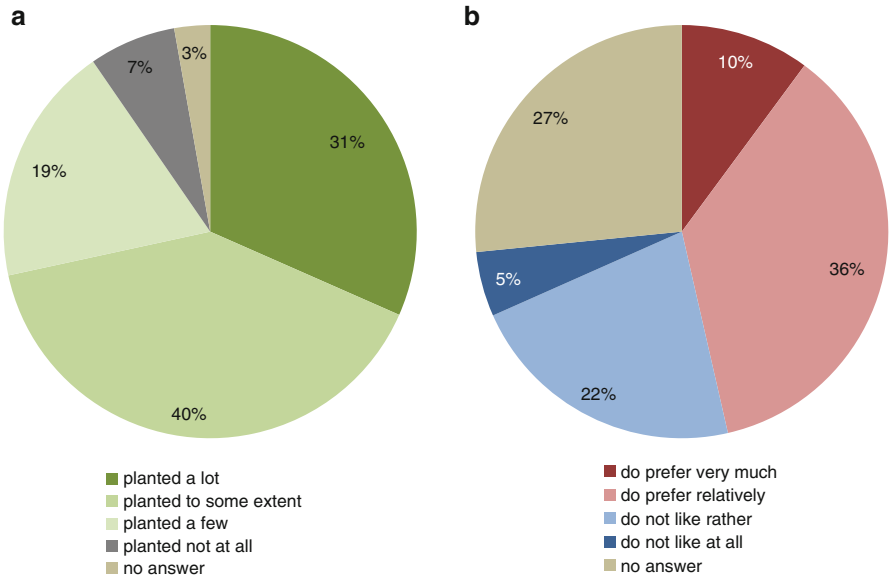


Fig. 5.17 (**a**) Green richness. (**b**) Care of own garden

and small animals in the forest and large animals in the forest respectively. In this case, the recognition of the owners is higher than the non-owners. Figure 5.18c shows the difference in recognition between the walker/non-walker in rural areas to bamboo expansion, lack of forest management, abandoned farmland, amount of vacant houses, ecosystem in paddy fields, ecosystem in grassland, insects and small animals in the forest and large animals in the forest, respectively. The recognition of walkers is also higher than non-walkers. These facts indicate that the intensity of involvement to a concrete action is strongly related to environmental recognition. Figure 5.18d shows the recognition difference between the generations. The younger the generation, the recognition of the environment becomes weaker. To combine with the results, it could be said that recognition of the environment by the younger generation could be enhanced by introduction of outdoor training in an educational curriculum.

5.3.4 Awareness of Living Organisms, Forests and Farmland Usage

Figure 5.19 shows the awareness of the increase or decrease of living organisms in the forest, grassland and paddy fields. Positive answers and negative answers are balanced in the case of living organisms in paddy fields and small animals in the forest. In the case of living organisms in the grassland, the rate of positive answers

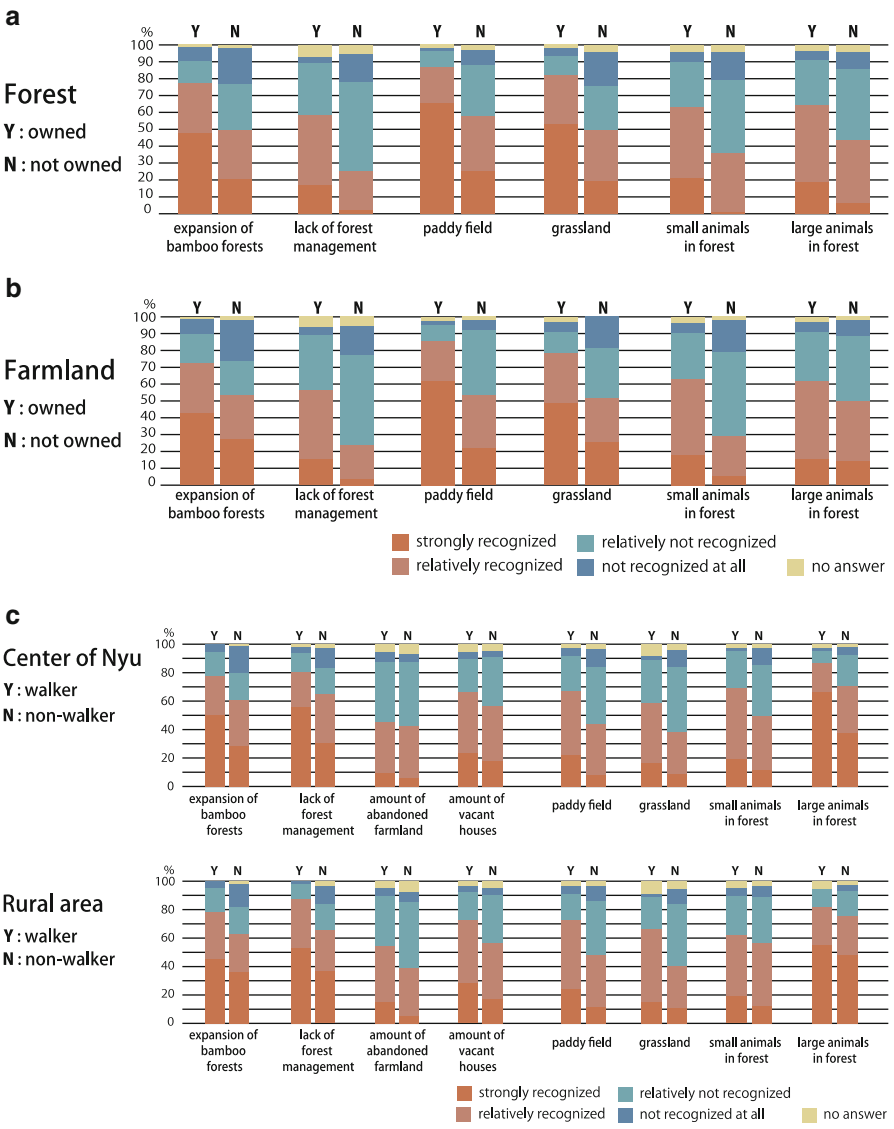
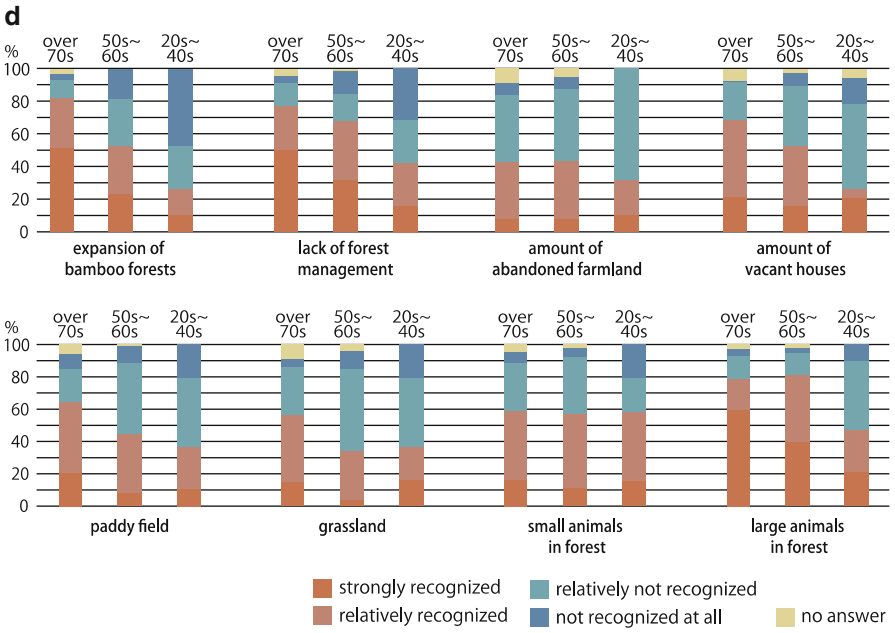


Fig. 5.18 (**a**) Forest owner. (**b**) Farmland owner. (**c**) Walker and non-walker. (**d**) Generation difference or recognition

is higher than negative answers. Especially in the case of large animals in the forest, the positive answers are dominant. Most of the respondents have strong awareness of the increase of large forest animals such as deer and wild pigs.

Sixty percent of the respondents answered that they have suffered harm from animals very frequently or relatively frequently (Fig. 5.20). The harm from animals



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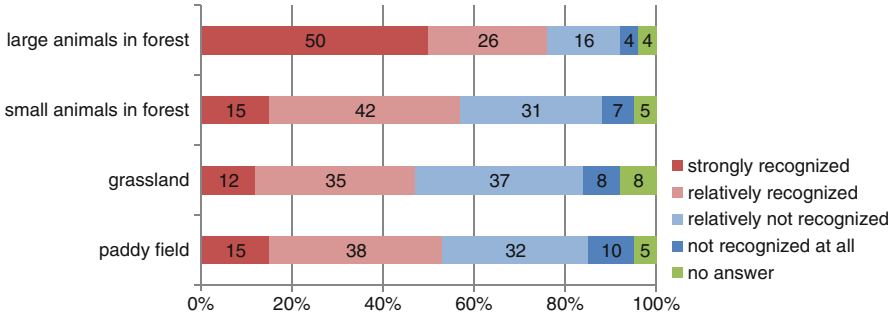

Fig. 5.19 Recognition of ecosystem

as a general problem in a *satochi-satoyama* zone in Japan is also clearly observed in the Nyu district.

Figure 5.21 shows that people use their privately owned forests for health promotion or as a hobby rather than for agriculture and forestry. Figure 5.22 shows the usage of privately owned farmland. Owners use them mainly for agriculture than for health promotion and hobbies, even though the usage for health promotion and hobbies is higher than that of forests.

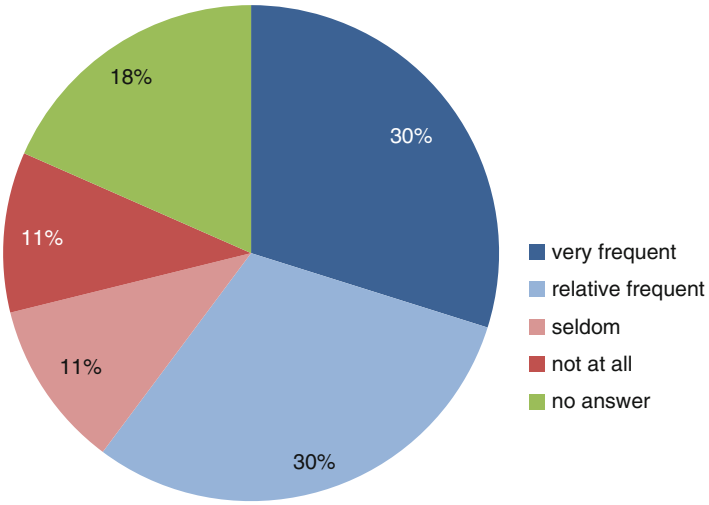

Fig. 5.20 Harm from animals

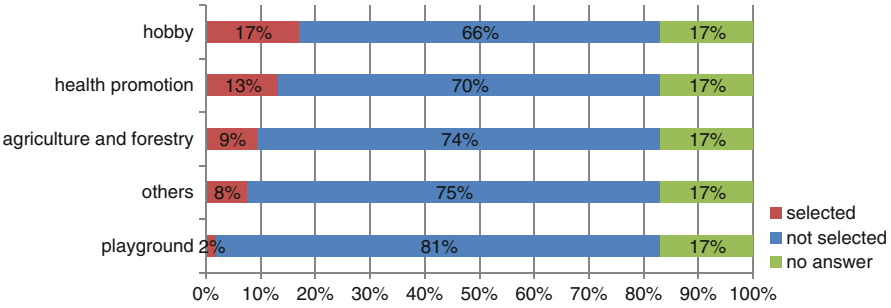

Fig. 5.21 Forest usage

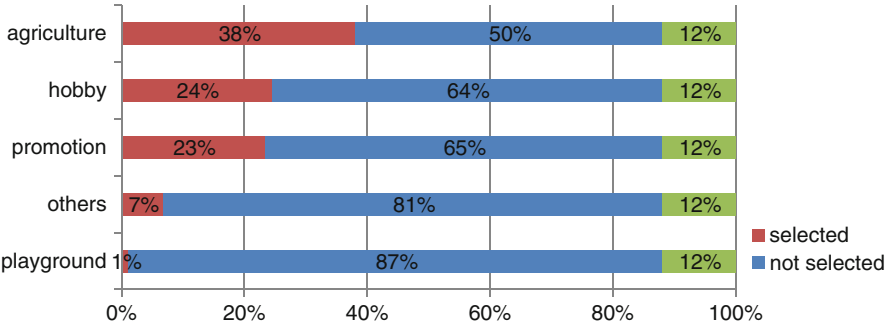

Fig. 5.22 Farmland usage

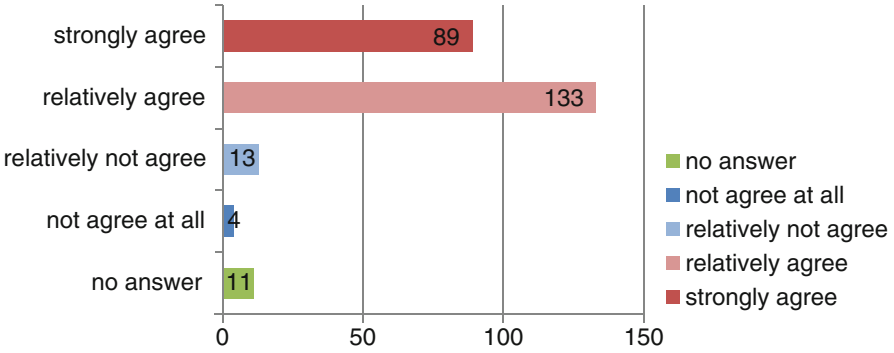

Fig. 5.23 Landscape can be improved by people

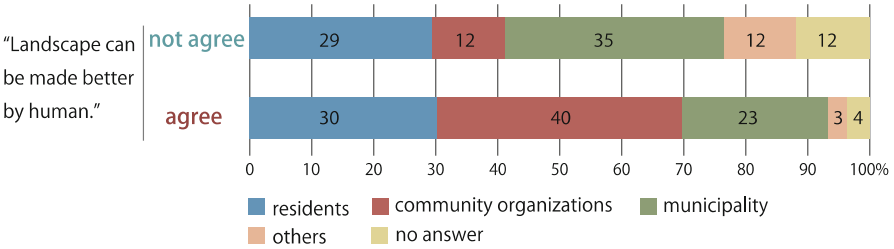

Fig. 5.24 Initiative body for landscape control

5.3.5 *Main Body of Landscape Improvement*

Most of the respondents think that the landscape can be improved by the efforts of people themselves (Fig. 5.23). It would be considered as a sign of pride of the people who have engaged to improve the environment around Nyu through activities such as planting hydrangea alongside small irrigation canals and paddy fields.

Figure 5.24 shows that respondents think that residents and community organizations must be the initiative bodies for landscape control. And the respondents who agree with community-driven efforts for landscape improvement think that community organizations should be the initiative bodies for landscape control. In fact, respondents feel that community organizations and residents have a strong will to make a beautiful landscape. On the contrary, they think the municipality does not have sufficient will to improve the landscape (Fig. 5.25). This result indicates the high pride of Nyu residents in managing the landscape.

5.3.6 *Summaries of Survey*

Nyu is a special *satochi-satoyama* district with high awareness of landscape and its management among residents. In the questionnaire survey, the importance of

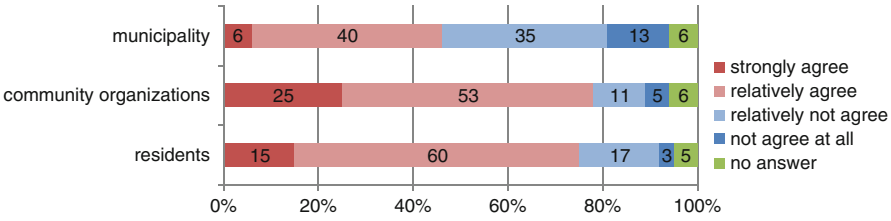

Fig. 5.25 Will to make a beautiful landscape

residential awareness and the role of community organizations are clearly shown. But in such areas, the degradation of landscape such as bamboo expansion, abandoned farmland, vacant housing and harm from animals is progressing. The economic background of farmland and forests has also been lost. The problem of the degradation of landscape and the loss of economic background seems not to be solved only by the efforts of the residents and the community organizations. Some political solutions that reach beyond the district might be developed for such structural problems. But, the awareness of the residents and community organizations might be the basis for efficient application of the political initiatives and can lead to fruitful outcomes.

From this questionnaire survey, we have learned that the awareness of the environment depends on the intensity of involvement in a concrete action such as walking. This fact might be useful for the development of an environmental education curriculum. We have also learned that the loads of residents as a management body must be taken into account by planning and introducing some measures in action.

5.4 Conclusion

In this paper, we proposed the concept of a *satochi-satoyama* connecting zone, which was defined by only using the digital elevation dataset of Japan. The concept of a *satochi-satoyama* connecting zone is useful for overviewing significant connections between nature and human activities. In landscape planning, watershed analysis can well describe a vertical structure from upstream to downstream. On the other hand, analysis of a *satochi-satoyama* connecting zone can describe horizontal connection of landscape. Landscape structures beyond municipalities and regions can be clearly shown by the integrated observation of these two concepts.

Through the consideration of the results of the questionnaire, the following points on the environmental perception of residents in Nyu become clear.

Environmental perception of residents in Nyu is very high and they have strong attachment to their living environment in Nyu. But they have relatively high anxiety to continue living in Nyu. The main sources of anxieties are related to desires and medical treatment, aging of the district, transportation, shopping and population decline. They strongly think that landscape can be improved by the effort of people

and community organizations. The big issues related to the environment are lack of forest maintenance, vacant houses, abandonment of farmland and harm from animals. The intensity of involvement in a concrete action related to the environment might enhance the environmental recognition. The loads of residents as a management body might be taken into account by planning and introducing some measures in action.

People living in Nyu have very high awareness of the environment and continuously try to improve it. But environmental threats such as harm from animals, lack of maintenance of forests and agricultural lands and loss of economic functions of forests and farmland are structural problems, which cannot be solved only by their own efforts. Some effective political measures in a regional scale might be integrated to such residential efforts. For integrating such measures, the recognition of a *satochi-satoyama* connecting zone integrated with watershed planning might be useful to develop wide area viewpoints.

In this paper we have employed two different research approaches from opposite points of view. One is the overview approach using GIS analysis and the other is the on-site approach using a questionnaire survey. To solve complex issues on the environment and landscape concretely, the perspective view in a broad scale and on-site observation in the target site must be combined. The results of on-site observation in Nyu were reported to the residents, and the discussion between researchers and residents was held in February 2013. The communication and collaboration between researchers and residents to solve complex issues on the environment and landscape will be continued.

According to the overview approach, more detailed analysis must be employed under the combination of different disciplines, such as economy, ecology, geography, urban design and so on. For such collaboration, the GIS database is very useful. The proposal of a *satochi-satoyama* connecting zone using a digital elevation dataset combined with watershed concepts could be a basis for creating common perspectives among researchers from different disciplines. This can lead to a simple definition of a concrete target zone.

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Chapter 6
Landscape Sequence and Fluvial Ecosystem of the Kushida River with Particular Reference to Its Basin Geologic Heterogeneity

Takashi Tashiro

Abstract The Kushida river basin, in the central area of Japan, is mainly composed of different geologic units such as plutonic, metamorphic, and sedimentary terrains. In order to clarify the effects of basin geologic heterogeneity on its fluvial ecosystem, both riffle and pool units in each of the 24 stations (six sites for the mainstem and three sites each for six tributaries) were investigated by taking into account their watershed geologies and landuses. Sediment samplings, topographic measurements, and water quality monitoring (temperature, pH and electric conductivity) were undertaken at these sites. Organic material parts of the sampled sediments were picked out to identify macroinvertebrate individuals at the species level, and the residual parts were used to estimate their size distribution. According to the results, topographic and geologic differences among the stations and tributaries have been understood in relation not only to their physical characteristics of bed compositions, but also to their dominant benthic macroinvertebrates in each of the sites. Consequently, it could be concluded that the stream macroinvertebrate community reflects the landscape sequences with geologic heterogeneities in the Kushida river basin.

Keywords Benthic community • Geographical information system • Geology • Landscape ecology • Riverbed material

6.1 Introduction

The landscapes of rivers have various scales of views, spatiotemporally. Conventionally, a series of landmark papers has developed the conceptual framework for landscape riverine research. Vannote et al. (1980) proposed the river continuum

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concept which was useful to understand how terrestrial and aquatic ecosystems interacted to control instream processes, from forested headwater streams to deep mainstem rivers, in a predictable way. Frissell et al. (1986) presented a framework for a hierarchical classification system for riverine landscapes, which described stream habitat structures related to hydrology, geology, and land form in various spatial scales such as catchment, segment and reach systems. Moreover, some geographical works have practically approached these kinds of descriptions of river landscapes by using the geographical information system (GIS), being typified as the River Style Framework (e.g. Brierley and Fryirs 2000). By adopting this framework in an Australian catchment, Fryirs and Brierley (2001) evaluated their sediment yield distributions, and Chessman et al. (2006) described the relationship between the classified geomorphic character and the riverine biota such as diatoms, macrophytes, macroinvertebrates and fish, qualitatively. The bio-assessment has not always been successful, however, and has not been generalized according to these kinds of approaches. The reason why is that it has not been designed to describe the biological viewpoints: how each of the species has physiological tolerances to various environmental conditions, microhabitat preferences, practical uses, and feeding behaviors. As described in some ecological review papers (Allan 2004a, b; Malmqvist 2002), bio-assessments corresponding to riverine landscapes are required for understanding the relationship between the biological characteristics and river landscapes.

By the way, geologic distribution is one of the crucial factors for understanding riverine landscape characteristics and their relation to the fluvial ecosystem (e.g. Frissell et al. 1986). Although most of the studies have been conventionally developed for evaluating sediment yield (e.g. Hirabayashi 2000; Inoue et al. 1992; Wallbrink et al. 1998), few studies have pointed out the sediment size distribution in each of landscape sequences such as step, riffle, or pool units with the processes of production, storage, and transport in river system (e.g. Frings 2008; Kodama 1994; Tashiro et al. 2008). Furthermore, although these geologic/sediment distributions have been recognized as one of the important factors for riverine habitat condition, there have been few attempts which have tried to describe the effects of basin geology on the riverine community (e.g. Olson 2012; Shearer and Young 2011). Currently, the relationship between basin geologic property and fluvial ecosystem has not been clarified. The objectives of this study are to evaluate sediment size distributions and these effects on benthic macroinvertebrate community structures in a river system with heterogenic geology from the viewpoint of riverbed grain size distribution with downstream fining processes in the Kushida river basin system.

6.2 Materials and Methods

The Kushida river is one of the major rivers that flows to the east through Matsusaka city and Taki town in central Mie Prefecture. The mainstem has a length of 87 km, and the catchment area is 436 km^2. The Kushida river originates from Mt. Takami (at an elevation of 1,249 m) which stands on the border of Mie and Nara Prefectures,

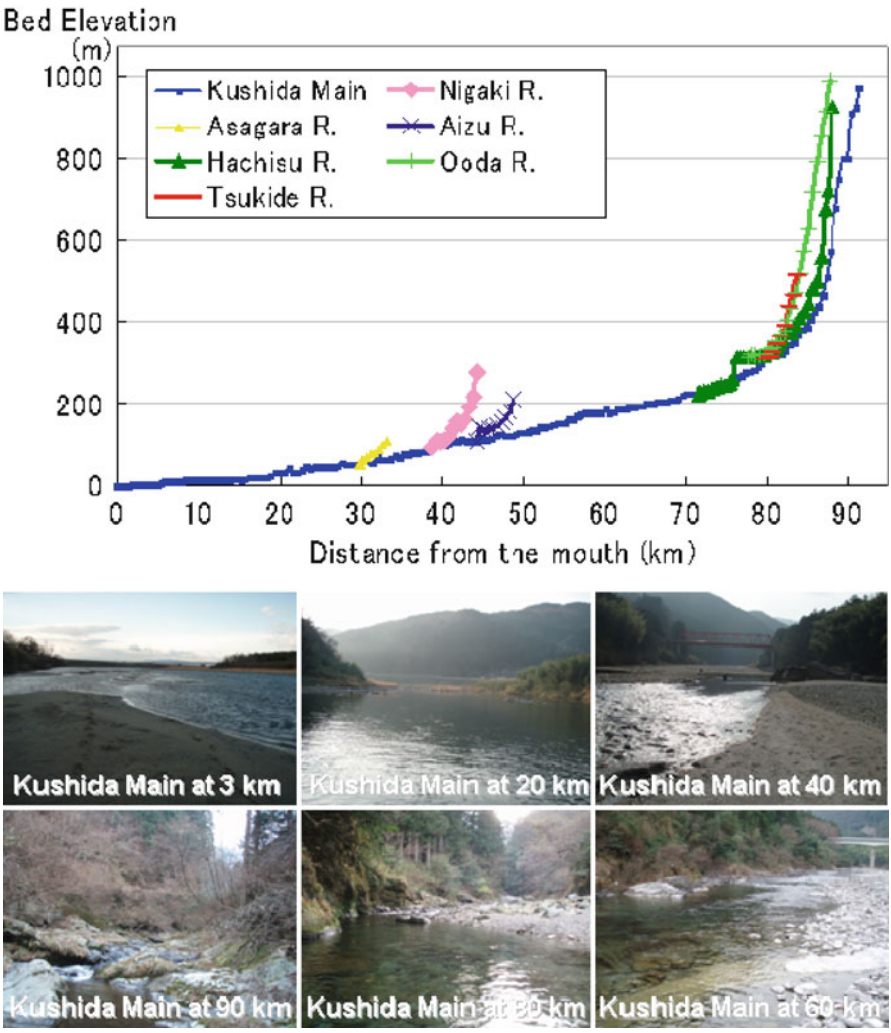

Fig. 6.1 Longitudinal bed profiles of the Kushida river mainstem and the investigated tributaries. The photographs taken in the mainstem stations (mentioned *below*) are also included in the *lower part*

and passes some dams and weirs before reaching its delta and flowing into Ise Bay (Chubu Regional Bureau, The Ministry of Land, Infrastructure, Transport and Tourism 2005). The riverine landscapes are composed of steep slopes and exposed rocks in the gorges of its mountainous area (like at the mainstem 60, 80 and 90 km stations from the mouth), are recognized as gravel or sand bars in the fluvial fans and terraces (like at the 20 and 40 km station) of its alluvial floodplain area, and are characterized as sand or mud flats (like at the 3 km station) in tidal deltas, as shown in Fig. 6.1. This figure shows the longitudinal profile of each of the rivers to be

investigated in this study, which was made by using Arc View 9.2 with the 50 m mesh DEM (digital elevation model) data published by the Geographical Survey Institute, Japan. The basin area of Kushida river was mainly covered by mountain forest area (63 %), farmland area (31 %) and residential area (6 %) in the year 2000 (Mie Prefecture), whereas it includes endemic geologic features such as the Median Tectonic Line (MTL) which is the longest fault system and runs through central southwest Honshu island. Maeda and Ichimura (1973) described the Kushida river terrace topography which was located nearly parallel to MTL. They clarified that there were three different levels of the terrace plains which had been developed after the MTL movement. They also indicated that granites or granodiorites (kinds of plutonic rocks) were distributed in the northern area of MTL, whereas schists or gneiss (kinds of metamorphic rocks) were distributed in the southern area. The basin has not been densely populated and the river has not been so drastically altered for developing water resources or controlling floods, which has generated (semi-)natural resources such as benthic macroinvertebrates (e.g. Kasai and Nakata 2005; Kishino et al. 2010) and juvenile fish (e.g. Yamada 2004) living in estuary tidal flats and rare bitterling fish and bivalves in drainage canals and paddy field fabricated floodplain environments (Kitamura 2007).

The research location was set in the Kushida river basin. This basin geology is mainly divided into the Ryoke plutonic (RP), the Sambagawa metamorphic (SM) and the Chichibu sedimentary (CS) terrains along to the Median Tectonic Line. The sites to investigate were selected in the mainstem and in each of the tributaries with three stations set at the upper, middle and lower reaches, as shown in Fig. 6.2. There are a total of six stations at 3, 20, 40, 60, 80, and 100 km from the river mouth in the mainstem (see Fig. 6.1), whereas the investigated six tributaries are as follows: Aizu, Asagara, Hachisu, Nigaki, Tsukide, and Ooda rivers. Each of the stations was characterized as a typical distribution of these geological terrains in the each stream watershed. Some of the tributary watersheds have homogeneous geology, such as the Nigaki river in the Ryoke plutonic terrain, the Aizu river in the Sambagawa metamorphic terrain and the Hachisu river in the Chichibu sedimentary terrain, whereas the others have the geological distributions composed of each of the two of them. This figure also includes the photographs taken in the mainstem stations.

A series of investigations in each station consisted of measurements of water quality, channel-unit topography, sediment distributions, and macroinvertebrates in pools/riffles. They were conducted in the winter season, from 21 November to 21 December 2007. The water quality was monitored for temperature, pH, and electric conductivity (EC [mS/cm]) with a multiple meter (556 MPS, YSI/Nanotech Inc.). Samplings of sediments and macroinvertebrates were carried out in both the bed surface area (400 cm^2) in 5 cm thickness at four pool units and underwater cobbles in riffle units. These samples were divided into organic/inorganic materials. Then, the former ones were used for identifying species compositions according to Kawai and Tanida (2005), whereas the latter ones were analyzed for grain size distributions.

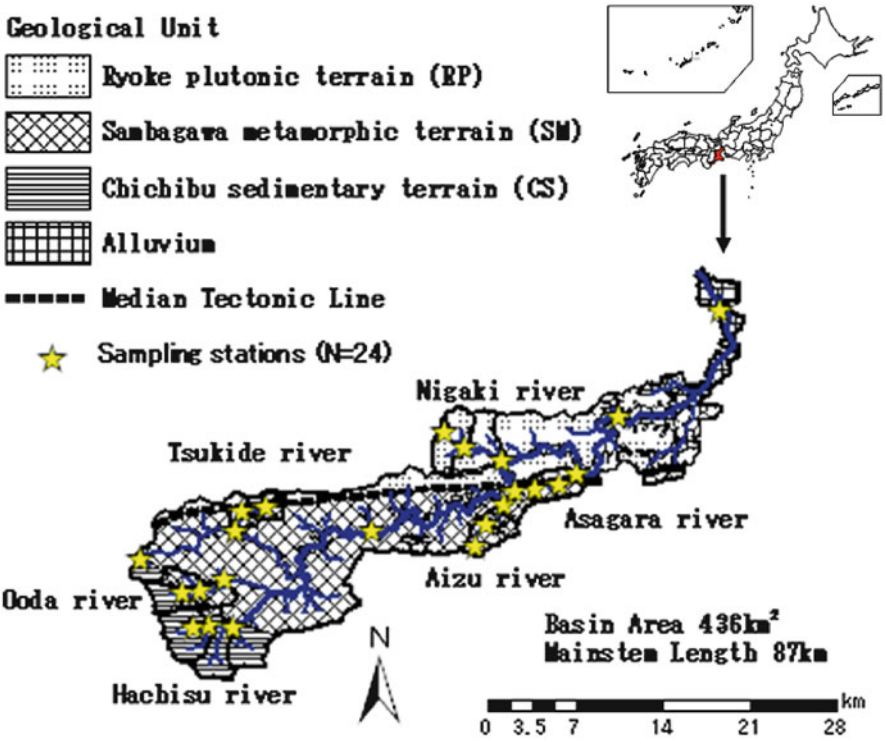

Fig. 6.2 Study site in the Kushida river basin, central area of Japan. The map was made by the GIS (geographical information system) software, Arc View 9.2 (by ESRI Japan) with the Seamless digital geological map of Japan 1:200,000 (Geological Survey of Japan, AIST 2009)

6.3 Results and Discussions

Figure 6.3 shows the water quality distribution in the mainstem and the tributaries of the Kushida river system. The electric conductivity (EC) data were low enough not to control living species (e.g. Olson 2012), and were decreased corresponding to the degradation of water temperature (from 60 to 100 km stations) in the mainstem. The downstream aggradations in tributary ECs could be observed in the Nigaki, Tsukide, and Ooda rivers. The differences were considered to be mainly dependent on the amounts of dissolved matter, because these increases were caused by gathering polluting loads from agricultural land and residential areas through the flowing down processes, with collecting water from these watersheds.

Figure 6.4 shows relationship between the watershed areas and the median grain sizes (D50s) of the pool sediments in all of the stations (N = 4, see Fig. 6.2). The downstream fining of bed sediments along the mainstem was observed, whereas those along the small tributaries were not formed, related to the river landscapes mentioned before (see Figs. 6.1 and 6.5). And also, Fig. 6.6 shows sediment size distributions in the upper, middle and lower reaches of the tributary stations (N = 4,

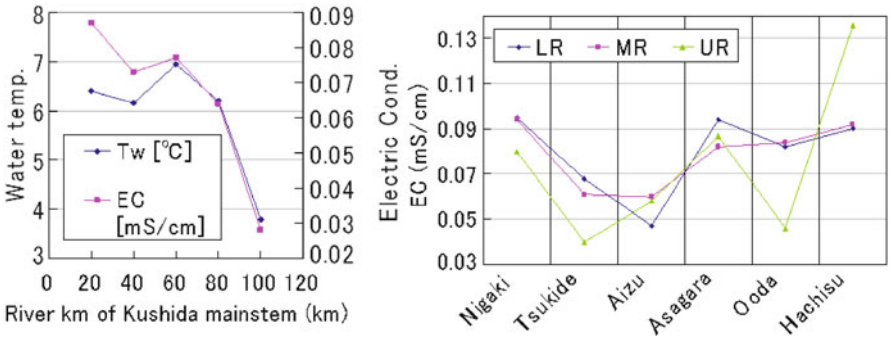

Fig. 6.3 Water temperatures and electric conductivities (ECs) in the mainstem of Kushida river on 21 December 2007 (*left figure*) and changing ECs in the each tributary with three stations (*LR* lower reach, *MR* middle reach, *UR* upstream reach), from 21 November to 4 December, 2007 (*right figure*)

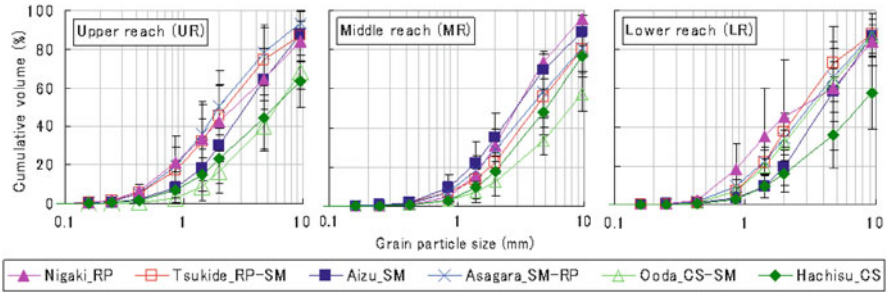

Fig. 6.4 Relationship between the watershed areas and the median grain sizes (averages and standard deviations, N = 4) of the pool sediments in all of the stations

see Fig. 6.2). It was found that a large amount (>20 %) of fine materials (<2 mm) were included in the stations in RP and SM terrain watersheds (Aizu, Asagara, Nigai and Tsukide rivers), whereas a large amount (>50 %) of coarse materials (>4.75 mm) were dominated in the most stations in CS terrain watersheds (Hachisu and Ooda rivers, except for the Ooda lower reach). Regarding the effects of the lithology, weathered granites were reported to have derived sand-sized grains (e.g. Tashiro et al. 2008) and to cause bimodal grain size distribution was found in a pool-riffle reach (e.g. Thompson et al. 2006), whereas schist and other metamorphic rocks were found to be less durable for abrasion (Attal and Lave 2006; Tashiro et al. 2008) and derived flattened grains (e.g. Tashiro et al. 2008). These conventional findings could justify my results that the fine materials were frequents in the RP/SM terrain watersheds with granite/schist lithologies. On the other hand, Fig. 6.7 shows the channel bed slopes (SLs) and median grain sizes (D50s) of the pool sediments in each of the stations with each of the homogeneous terrains.

Fig. 6.5 Photographs taken in the stations which include *upper reaches* (*upper photos*) and *lower reaches* (*lower photos*) in the three tributaries such as the Nigaki river in the Ryoke plutonic terrain, the Aizu river in the Sambagawa metamorphic terrain, and the Hachisu river in the Chichibu sedimentary terrain. The cobble characterized each of the geologic units are also shown, as their pictures on the *lower ones*

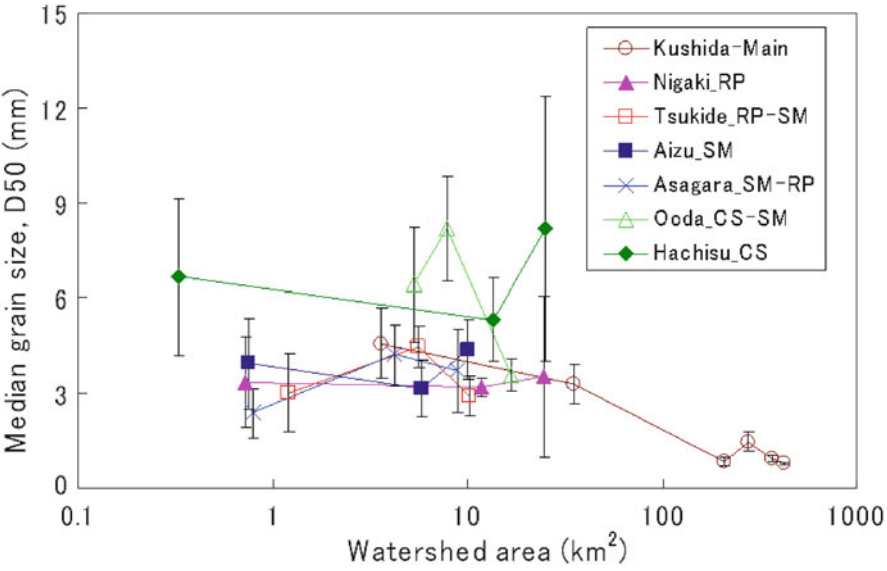

Fig. 6.6 Grain size distributions of the sediment sampled in tributary stations. Each plot/error bar means the average/the standard deviation value of the cumulative volume at each of the sample sizes

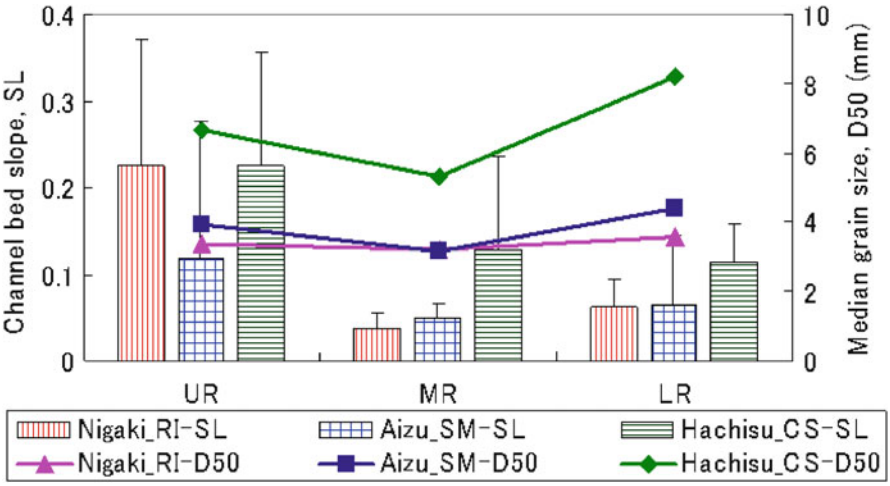

Fig. 6.7 Channel bed slopes (*bars*: averages and standard deviations) and median grain sizes (*plots*: averages) of the pool sediments in the stations with a homogeneous terrain

Although they were similar in SLs and watershed areas (see Figs. 6.7 and 6.8), there was a remarkable difference in D50s between the upper reach of Nigaki and Hachisu stations. Hence, by combining the results relating sediment size and topography, the sediment distributions were caused not only by fluvial processes related to channel characteristics, but also by lithologic distribution related to geologic heterogeneity (e.g. Attal and Lave 2006; Frings 2008; Kodama 1994; Tashiro et al. 2008).

Furthermore, as a result of the macroinvertebrate investigations, Table 6.1 shows the dominant species (>15 % in the percentage of individuals) in pool sediments and on riffle cobbles of tributary stations. And also, the typical dominant species and their inhabitations listed in Table 6.1 are shown in Fig. 6.8. I could find the differences in benthic community characteristics related to the differences both in channel units and in watershed geologies. By combining these results with the heterogeneity of sediment size distribution, I could clarify that some species were strongly related to the specific sediment particles characterized in their lithology/geology, such as follows: a mayfly *Ephemera japonica* (see Fig. 6.8a) and another mayfly *Ecdyonurus bajkovae* were often observed in pool sediments, whereas a crane fly *Antocha* sp. (see Fig. 6.8b), some species of cased caddisflies (see Fig. 6.8c) and some species of net-spinning caddisflies (Hydropsychidae, see Fig. 6.8d) were mostly abundant on riffle cobbles. *Ephemera* genera were known as burrowers into sandy substrate and for having higher densities in pools with such fine-grained sand depositions (e.g. Dudgeon 1996; Kawai and Tanida 2005; Kobayashi and Kagaya 2002). The body of *Ecdyonurus* genus was dorsally compressed to adapt for clinging to the substrate surface to prevent flushing by water currents (e.g. Nielsen 1950), which was quantitatively described in the laboratory experiment by Statzner and

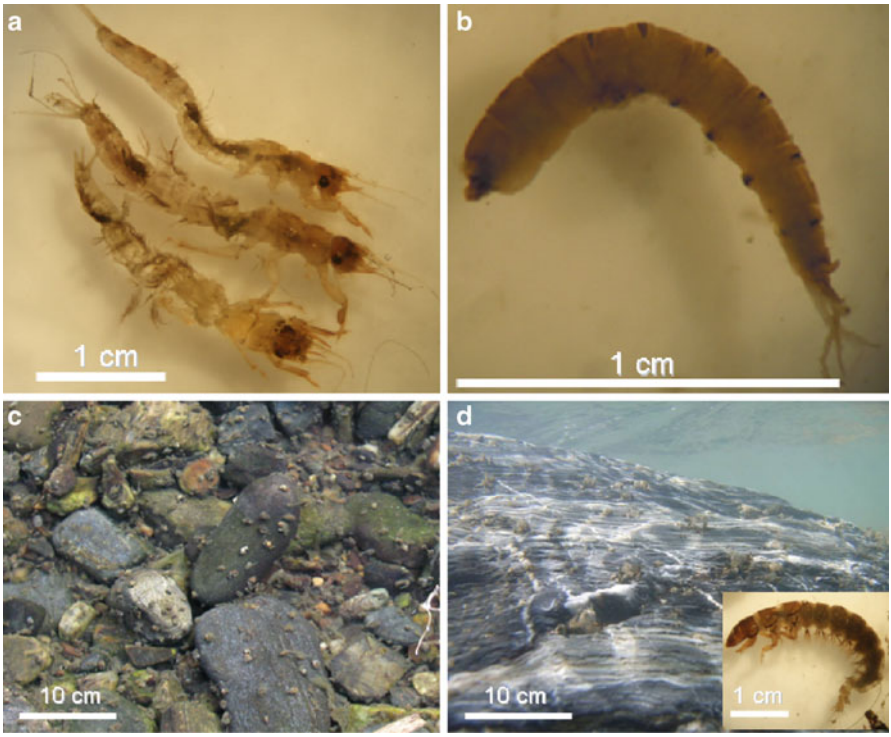

Fig. 6.8 Photographs of typical dominant species and their inhabitations: (**a**) *E. japonica*; (**b**) *Antocha* sp.; (**c**) nests of cased caddisflies (*Glossossoma* sp.) and (**d**) net-spinning caddisflies (Hydrpsychidae) attached on cobble surfaces

Holm (1982). They could characterize an effect on drag reduction by flow separation control in the flow field behind its body. Therefore, I could consider that *E. japonica* were frequent in the sandy substrates of the RP terrain, whereas small sized *E. bajkovae* individuals (around 5–7 mm in body length, e.g. Kawai and Tanida 2005) clung onto the flattened gravel in the SM substrates (e.g. Tashiro et al. 2008). On the other hand, *Antocha* genus with its silken case was found on the sides and upper surfaces of riffle substrates, and was recognized as the collectors and gatherers feeding primarily on detritus and algaes (e.g. Fuller and Hynes 1987). By taking into account both this ecological finding and the results regarding physical environment conditions mentioned above, it is suggested that *Antocha* sp. prefers the flattened surface of schist cobbles in SM terrain. And also, it was reported that most caddisfly larva built their nests with various materials and functions (e.g. Kawai and Tanida 2005; Okano 2012). Cased caddis larvae such as *Glossosoma* sp. and *Micrasema quadriloba* which were known as the grazers feed on algae attached on substrates by moving with their cases (see Fig. 6.8c, e.g. Jin and Ward 2007; Katano et al. 2005; Okano 2012), whereas net-spinning caddis, Hydropsychidae larvae, which were know as the filterers, feed on suspended organic matter by

Table 6.1 Dominant species (>15 % in the number of individuals) of benthic communities in pool sediments/on riffle cobbles of tributary stations

Tributary	Geological unit	UR: upper reach		MR: middle reach		LR: lower reach	
		Pool sediment	Riffle cobble	Pool sediment	Riffle cobble	Pool sediment	Riffle cobble
Nigaki	RP	*Geothelphusa dehaani* freshwater crab	*Thienemanniella* sp. non-biting midge	*Semisulcospira libertine* stream limpet	*Glossosoma* sp. cased caddisfly[c]	*Potamanthus formosus* mayfly	*Rheotanytarsus* sp. non-biting midge
		E. japonica[a] mayfly	*Rheotanytarsus* sp. non-biting midge				*Antocha* sp.[b] crane fly
Tsukide	RP-SM	*E. japonica*[a] mayfly	*Uenoa tokunagai* cased caddisfly[c]	*E. bajkovae* mayfly	*Psychomyia* sp. cased caddisfly[c]	*E. bajkovae* mayfly	*M. quadriloba* cased caddisfly[c]
				Elminae riffle beetle	*Orthocladius* sp. non-biting midge	Elminae riffle beetle	
Aizu	SM	*E. japonica*[a] mayfly		Naidinae sludgeworm	*Antocha* sp.[b] crane fly	*E. bajkovae* mayfly	*Antocha* sp.[b] crane fly
		DIPTERA fly			*Rheotanytarsus* sp. non-biting midge	Leuctridae stonefly	
Asagara	SM-RP	*Gumaga orientalis* cased caddisfly[c]	*Baetis thermicus* mayfly	*Thraulus* sp. mayfly	*Cheumatopsyche* sp. net-spinning caddisfly[d]	*Neoperla* sp. stonefly	*Hydropsyche orientalis* net-spinning caddisfly[d]
		Elminae riffle beetle	*Cheumatopsyche infascia* net-spinning caddisfly[d]				*Hydropsyche* sp. net-spinning caddisfly[d]
Ooda	SM-CS	Chloroperlidae stonefly	*Antocha* sp.[b] crane fly	*Erioptera* sp. crane fly	*Epeorus* sp. mayfly	*E. bajkovae*[b] mayfly	*M. quadriloba* cased caddisfly[c]
			Orthocladius sp. non-biting midge		*Eukiefferiella* sp. non-biting midge		
Hachisu	CS	*Paraleptophlebia* sp. mayfly	*Torrenticola* sp. water mite	*M. quadriloba* cased caddisfly[c]	*M. quadriloba* cased caddisfly[c]	*Torleya japonica* mayfly	*Baetiella japonica* mayfly
		Chloroperlidae stonefly	Orthocladius sp. non-biting midge				*Epeorus latifolium* mayfly

Both Latin and English names were described
Superscript characters such as a–d correspond to those in Fig. 6.7

staying with their nets and nests built on substrates in riffle units (see Fig. 6.8d, e.g. Georgian and Thorp 1992; Okano 2012; Tashiro and Tsujimoto 2006). Especially regarding the case of caddisflies, *Glossosoma* genus was found to mainly utilize the habitat conditions on the substrate surfaces in riffle units (Jin and Ward 2007; Okano 2012), whereas *M. quadriloba* was reported to migrate to the preferred habitats with available attached algae (Katano et al. 2005). These conventional findings partly support the concepts that some species of cased caddisflies should be dominant in the riffle units except for having the cobbles dominated by *Antocha* sp. (Nigaki-LR, Tsukide-MR and LR stations) or Hydropsychidae (all of the Asagara stations), and could be dominant in the pool units except for having the sandy substrates derived from the weathered granites in the RP watersheds. Consequently, the fluvial macroinvertebrate community could reflect the sediment condition related to the geologic distribution in its watershed.

6.4 Conclusion

In the present study, physical characteristics of stream bed materials were examined by analyzing the field measurement of their topography and riverbed grain size distribution in geologic heterogeneity in the river basin system. Moreover, the benthic community species identification could clarify the characteristics of the fluvial ecosystem in each of the sites. By combining these results, I might understand source and size distribution of sediment and these effects on the benthic community in a river basin system with heterogenic topography, geology, and lithology, including the viewpoint of grain size distribution along with downstream fining process.

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Chapter 7
Planning Invisible Landscapes: Making Invisible Tidal Flat Landscapes Visible for Future Sustainability

Hiromi Yamashita

Abstract There is little detailed study on how wetlands and tidal flats are perceived by people who have not had direct contact with them. However, it is well observed by wetland conservationists in many countries that wetlands and tidal flats have often been referred to as "wastelands" by the general public. Although the ecological importance of wetlands and tidal flats is widely communicated in recent years, they are still under great pressure from urban and coastal development projects in Japan and abroad. In terms of landscape planning, it is also important to consider how to accommodate conservation of wetlands in the designing process. The aim of this chapter is therefore to consider: (1) the general perceptions of wetlands, especially tidal flats, as noted in the literature as well as those of university students in Nagoya; (2) existing tidal flat management arrangements and issues for the conservation and sustainable use of the areas; and (3) the implications of these for future landscape planning and environmental decision making.

Keywords CEPA • Decision making • Landscape planning • Social perceptions • Tidal flats • Wetlands

7.1 Introduction

When we hear the word "landscape", almost automatically we think of scenery that is "beautiful" or "pretty": unspoiled mountains, rolling hills, and flower-filled fields. But what happens when the landscapes which some of us are trying to protect and conserve are regarded by many as "not pretty" or even "dirty"? What happens when those landscapes are not visible in terms of a physical presence, in documentation, and people's awareness?

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This chapter looks at one such type of landscape, tidal flats, to help us to consider how we could plan "invisible" landscapes better, and how landscape planners could work with people's perceptions, especially negative ones. This chapter firstly explores social perceptions of tidal flats including those mentioned in the literature and by university students, then the issues in existing tidal flat management for conservation, and lastly the implications of these for future landscape decision making.

7.2 Social Perceptions of Tidal Flats

A tidal flat is a curious place where mud appears in shallow areas of coastal water when the tide is low. It supports not only an immense variety of wildlife, but also has an economic value, including providing a source of food, water purification, erosion control, and reducing damage from tsunamis. Among conservationists, tidal flats are regarded as one of the most important areas to conserve for the health of the wider coastal and oceanic environments. International convention documents, such as those produced by Ramsar, emphasize this (e.g. Ramsar Convention Secretariat 2008).

In this context, cities within 60 km of the sea are growing. Some 60 % of the world's population lives within 60 km of the sea and current trends suggest that this figure will rise to 75 % by the year 2025. Three quarters of the world's megacities are coastal, even though coastal regions harbour many of the Earth's most diverse, complex, and productive ecosystems (UNESCO 1997). Many of the city developments in coastal areas have utilized tidal flats to expand available land to use for living, transportation, and infrastructure. At the present time, in many countries more than half of the population lives in a coastal zone, a percentage that is increasing. Japan has more than 4,000 harbours, one for every 8 km of shoreline; 51 % of its shoreline is bordered by artificial structures. Other examples include England with 38 % and Belgium with 85 % (Walker 1994). Although the ecological importance of wetlands and tidal flats has been widely communicated in recent years (e.g. Smardon 2009), they are still under great pressure from urban and coastal development projects in Japan and abroad. In Japan, between the 1940s and 1980s nearly 40 % of the natural tidal flats were lost through reclamation, and currently it is said to be 50 % or more (e.g. Baba et al. 2003). Ise Bay also had many shallow areas of water (tidal flats) in 1922, but most of them were lost due to land reclamation, and the one small area that is left is the Fujimae tidal flat (Fig. 7.1).

Coastal regions are becoming an increasingly important part of our lives and they are of particular significance in island states such as the UK and Japan. Coastlines in the world have a length of approximately one million kilometres, and coastal zones have provided a source of "livelihood, enjoyment, and inspiration for humans throughout much of their history" (Walker 1994, p 103). For island nations, coasts have also served as defence frontiers for military purposes and prevention of illegal immigration. In the course of history, much of the coastline has been modified and developed to suit human purposes (Palmer 1998; PEMSEA 2003). Walker explains that "the most conspicuous boundary on Earth is that which joins land and sea…It is a zone whose resources have been exploited heavily and whose physical form has

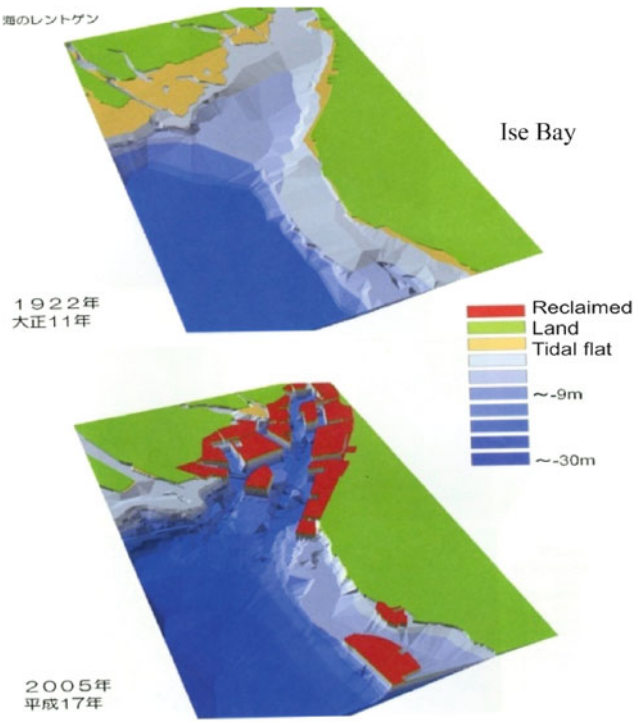

Fig. 7.1 3D map to show the loss of tidal flats in Ise Bay (1922–2005) (Okamine 2007)

been modified drastically" (Walker 1994, p 103). Helpern et al. (2008) consider Japanese waters to be one of the four regions which have received the highest level of human impact on its environment in the world.

With the above background in mind, let's look at social perceptions of tidal flats to consider their implications in landscape planning.

7.2.1 Social Perceptions of Tidal Flats in General

In terms of social perceptions of tidal flats, there is little detailed study on how tidal flats are perceived by people who have or have not had direct contact with them. However, it is well observed by wetland conservationists in many countries that wetlands and tidal flats have often been referred to as "wastelands" by the general public (e.g. Richardson 1983; Kumar 2000).[1]

[1] Definition of wetlands according to the Ramsar Convention: "areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with mater that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide dose not exceed six metres" (Ramsar Convention 1997 Article 1.1) it is where the land meets the water, and it includes tidal flats, mudflats, coral reefs, beaches, mangroves, lakes, rivers, ponds, and rice paddies. In this artice, I am going to mainly focus on tidal flats.

Definitions of tidal flats also vary considerably according to the identity of those providing the information. For example, the information provided by the Isahaya Bay Land Reclamation Office (2005) refers to the tidal flat as something of a "nuisance", "which causes flooding and disasters", and "which troubles people" since the accumulated mud could block water drainage gates. On the other hand, the NGOs which try to protect tidal flats from development describe them as a "source of life" that "helps to create the 'sea of plenty'" and as a 'sea of treasure' [Takara no umi] (Yamashita 1990; Unoki 2006). Among conservationists and environmental educators, metaphors of body parts are also often used to explain the importance of tidal flats; for example, describing tidal flats as the "womb of the sea" (since they provide spawning grounds and nurseries for fish before they move to the outer sea), and as the "kidney of the earth" (due to their water purification mechanism[2]) (Yamashita 1990; Yamashita 1998; Ariake Sea Fishermen and Citizen Network and Isahaya Tidal Flat Emergency Rescue Tokyo Office 2006).

Another issue is that the term used to describe tidal flats could create misunderstandings. In Japanese there are a number of terms used for tidal flats, the most common being *higata* (which literally means a shallow area of water which becomes dried out) and *gata* (the shortened version of *higata*, which is often used by fishermen or those who are familiar with *higata*). But I have come across another term which describes tidal flats: *hedoro* (which means sludge). This term was used during interviews between 2006 and 2011 with fishermen both in the Ariake Sea area in Saga and Nagasaki (in southern Japan), as well as in Ago Bay (in central Japan) and in the Hachirogata region in Akita (in northern Japan). The term *hedoro* is generally used for sludge which is either contaminated or contains industrial pollution, and it has very negative connotations: dirty, smelly, and polluted. However, when those fishermen use the term *hedoro*, it means simply a tidal flat or tidal flat mud which is not polluted or smelly, but is full of living creatures. When I heard the term *hedoro* used during the interview, I had to clarify with the fishermen what they meant. If they used the term casually with others in a different context their intended meaning could be hugely misunderstood. Something wet and muddy also has negative connotations in general, and getting muddy is seen as undesirable in many cultures. In addition, the gray colour of tidal flats does not help to give it a positive image.

During the interviews I conducted in the Ariake Sea area in Nagasaki and Saga, generally speaking, those people who had a positive image of tidal flats had some experience of them. Those who had directly been to the tidal flats mentioned the variety of living creatures and seafood they had encountered, caught, or ate. On the other hand, those who had seen tidal flats but had never been directly on them, had negative images of them, for example "I don't understand why you go to these places to get muddy" (interview in Isahaya 2011). This is also linked to the fact that the living creatures of the tidal flats are often too small to be seen by the naked eye (Yamashita 2009). This could be another hindrance in the general public's ability to recognize tidal flats' importance and biodiversity when compared with other types of coastal wetlands such as coral reefs.

[2] For example, one adult Asari clam in a tidal flat purifies 1 L of water per hour (e.g. Kohata 2002).

Fig. 7.2 Fujimae tidal flat (photo on the *left* taken by Ohata Koji, photo in the *center* taken by Umemura Yukitoshi); Suncheon Bay in Korea (photo on the *right* taken by Yamashita Hiromi)

7.2.2 Perceptions of Tidal Flats Among University Students in Nagoya

Over a period of 3 years (2010–2012), I asked master's degree students at Nagoya University to fill out a form before the lecture about tidal flats and I started to capture what kinds of images of tidal flats the graduate students had. The students were from various fields of study, including earth science, architecture, civil engineering, sociology, environmental policies, and media studies. In total, I collected data from 313 students. I asked them fill in the words that came to mind (1) when they heard the word *higata* (tidal flat) and (2) when they were shown pictures of a *higata* (tidal flat). In some ways the choice of pictures determined what they said, so although the results of this exercise are not representative of what students or people would think of tidal flats in general, they provide some interesting data. Although it might disadvantage tidal flats, for this exercise I deliberately used pictures of tidal flats without birds on them, since I wanted to show tidal flats on "ordinary days" (Fig. 7.2). Of course tidal flats are very important places for birds, especially migratory birds; however, their visits are occasional during particular times of the year, and they might be too far away for people to spot with the naked eye. Crabs are also not seen in the pictures, since most of them burrow into the mud when they realize that people are about.

The words and comments which most of the students used in relation to the term *higata* (tidal flat) are given below. Although there are some positive terms, it is clear that most of the comments have negative connotations.

Positive comments: Rich ecosystem; a variety of creatures; many birds; small living creatures; clams; Ramsar sites

Negative comments: Smelly; muddy; slimy, wet, not impressed; close to the cities, dirty, polluted sludge; not beautiful; gray; difficult to walk on, won't be able to get out from there; fights between development and conservation.

As well as giving lectures, over those 2 years I took a total of 16 master's degree students studying media to tidal flats prior to creating visual commercials about tidal flats. We visited Shiokawa Higata in Tahara city, and Fujimae tidal flat in Nagoya city, both in Aichi prefecture, Japan. I also asked them to fill in the form with the words which came to mind (1) when they heard the term "tidal flat"

Table 7.1 Changes in the terms used when a student thought of tidal flats

1	When they heard the term "tidal flats"	Dirty, big, smelly, depressing, quiet, empty, dead bodies of creatures
2	When they saw the photos of tidal flats	Dirty, big, smelly, depressing, quiet, wet, cloudy, crabs, footsteps, rubbish
3	After visiting tidal flats	Super big, bird, wet, shellfish, crabs, shrimp, strong winds, gentle waves, rubbish, shock, hopes, many living creatures, fun

(before the visit); (2) when they saw the photos of tidal flats (before the visit); and (3) after the visits to tidal flats. Table 7.1 is the data from a typical student's comments from among the group.

A tidal flat is a curious place, since showing the photos to people would be unlikely to have a positive impact on their perceptions of the place. The photos of other types of wetlands, such as coral reefs or beaches, might get very different reactions from people. However, those who visit tidal flats clearly recognize their positive attributes.

Apart from being "fun" to visit, tidal flats have various important ecological functions as mentioned above. In an interview in the Ariake Sea region, a secondary school teacher told me the current education curriculum is a possible reason why many people are not making links between their lives and the environment. He said the current environmental education and biology lessons in Japan often fail to connect the environment and human activity, especially when it comes to discussions on the food chain. The typical illustration used to teach the food chain is often based on the land. It shows plants, which are eaten by insects, which are then eaten by small birds or animals, which are then eaten by bigger mammals such as eagles or lions. Eagles and lions are listed as two of the highest levels in the food chain in nature.

However on wetlands and tidal flats, the chain links directly to human activity. For example, Fig. 7.3 shows an illustration of the tidal flat food chain, which includes cities and humans. It also argues the importance of eating seafood which is caught near to where citizens live (when it is not overfished) as one of the ways to take out nitrogen from the sea and also to complete the natural food chain: humans drain water (sewage) with nutrients into the sea, the bacteria and plankton eat them, they are then eaten by the fish or shellfish, and they are eaten by humans. Even one drop of sea water contains hundreds of plankton and bacteria and tidal flats hold rich biodiversity which is the backbone of coastal ecosystems. Figure 7.3 is the illustration created by the Fujimae higata o mamorukai, which the teacher interviewed thought should be replacing the traditional food chain explanation.

7.3 Issues with Existing Tidal Flat Management

When there is a strong possibility that people in general are not interested in tidal flats, there should be a management mechanism for conserving tidal flats to protect their important ecosystems. But when it comes to the question of who is officially

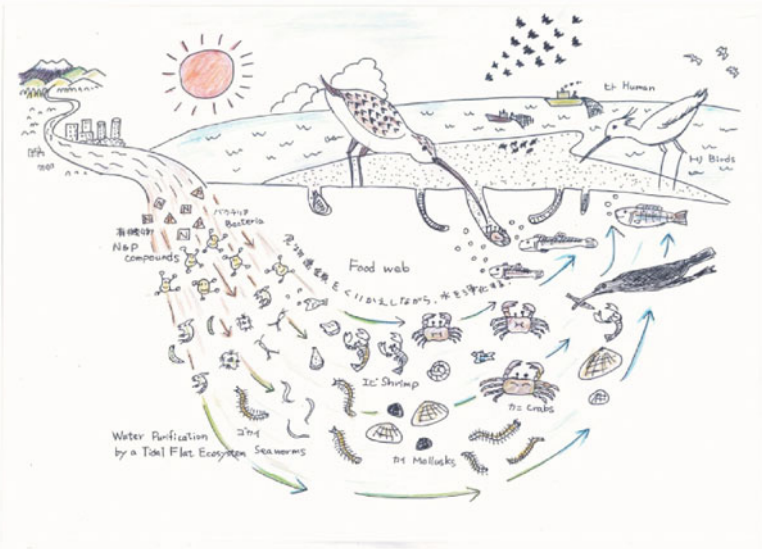

Fig. 7.3 The food chain and water purification mechanism by living creatures on tidal flats (Fujimae higata o mamorukai 2013)

responsible for the tidal flats in Japan, the answer would be "everyone" and "no one": everyone should be looking after them since the effects of the tidal flat ecosystem services stretch across different governmental departments, but in practice no one is designated to look after tidal flats across different areas. The next section looks at issues with existing tidal flat management, particularly: (1) unconnected management mechanisms with different roles in coastal management, and (2) tidal flats' invisibility on maps.

7.3.1 Unconnected Management Mechanisms with Different Roles in Coastal Management

One of the biggest reasons why I mentioned that tidal flats are looked after by "everyone" is that there are various ministries and their local offices with responsibilities for coastlines. This is partly because when the Coast Act [kaigan ho] was set up in 1956, various departments bid to take charge of aspects of the management of coastlines according to what was planned and placed along the coast at the time or in the future (Table 7.2). The primal aim of the Coast Act was not to protect coastal biodiversity, but "to achieve conservation of the country [territory] by protecting coastlines from disasters due to tsunamis, high tides, surges and other changes of sea water or land that are behind the shoreline, by servicing and conserving the

Table 7.2 Types of coasts defined by the Coast Act 1956

Types of coasts	Management responsibility	Role
Shores for agriculture [Nochi kaigan]	Ministry of Agriculture, Forestry, and Fisheries	To protect agricultural land and activities behind the shore from erosion and natural disasters
Shores for fisheries [Gyoko kaigan]	Ministry of Agriculture, Forestry, and Fisheries	To protect fishing ports and fishing activities
Shores for ports [Kowan kaigan]	Ministry of Land, Infrastructure, Transport, and Tourism (the areas previously looked after by the Ministry of Transport)	To protect port infrastructures and related business infrastructures from erosion and natural disasters
Other protected shores [Sonota kaigan hogo chiku]	Ministry of Land, Infrastructure, Transport and, Tourism (other areas previously looked after by the Ministry of Construction, Ministry of Agriculture, Forestry, and Fisheries)	To protect people's lives and possessions behind the shoreline

Fig. 7.4 A coastal area map in Aichi prefecture (Aichi prefecture 2012, p 1): This map shows the sections of shoreline under different management bodies [Water Management and Land Protection (*pink lines*), Port Authority (*purple lines*), Rural Development Bureau (*orange lines*), Fisheries Agency (*green lines*)]

coastal environment, and by encouraging appropriate use of coastlines by the public and to conserve the coastal environment" (Ministry of Justice 1956).

Figure 7.4 shows a part of the map which is published by the Port and Harbour Division of Aichi prefecture. One can see how the shoreline is divided into various colours which represent who is responsible for each section. Each management body has a different purpose regarding the shores; some are focused on protecting

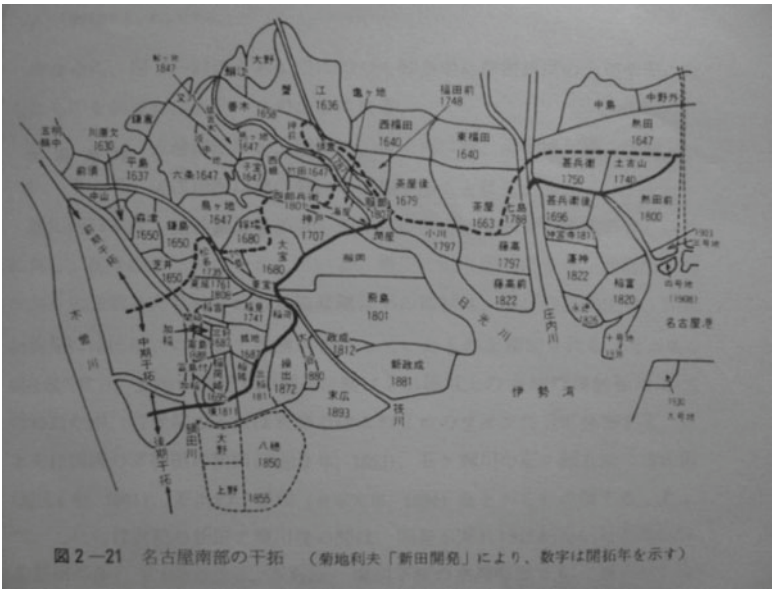

Fig. 7.5 History of land reclamation in Nagoya city (Aichi prefecture 1980, p 97)

the land behind the shores not conserving the sea and tidal flats. It is difficult to negotiate the conservation of tidal flats as well as improve the connectivity of the management bodies, but this is needed to protect environments such as tidal flats which are affected by decisions being made in neighbouring sections of shoreline.

During the 1980s some wetland NGOs in Japan discussed whether to ask the government to set up a 'Shoreline Conservation Law' which could look at coastal biodiversity, including tidal flats, in a more connected manner (Kayano 2011); however, these discussions did not progress any further.

7.3.2 Tidal flats' Invisibility on Maps

When tidal flats are not included on various planning maps in Japan, the suspicion is that those who have drawn them are not aware of tidal flats or regard them as unimportant. Figure 7.5 shows a map of the history of land reclamation in Aichi (Aichi prefecture 1980). The numbers on the map tell the year when the lands were reclaimed from the sea, and one can see how people in the past slowly advanced towards the sea as the soil from the river accumulated near the river mouth. The letters on each section show the names given to the reclaimed land. Interestingly, sometimes these are names fishermen used for particular areas of the sea before reclamation to aid navigation and communication, although these had almost never been included on maps. But when that particular area of the sea was utilized to create

Fig. 7.6 Chita city planning area master plan (Aichi prefecture 2011, p 2)

land, sometimes the names which fishermen used to use appeared on the map as a name of new land.

This custom of not mentioning tidal flats on maps is observed everywhere in planning maps. For example, this map of the Chita city master plan does not show the tidal flats or the shallow areas of the sea (the sea is all simply blue), although there are various tidal flats in this area (Fig. 7.6).

The exception is the maps created by the Geospatial Information Authority of Japan where the noting down of tidal flat areas started in the Meiji era (around the 1860s to 1910s). Since 1955 it has also looked into the shape, depth, sediment types, and plants of lakes; since 1993 that research was extended to other types of wetlands. As seen in Fig. 7.7, a legend is included to show the tidal flats (a dotted line with small dots within the sea), along with other coastal features such as beaches. The nature of daily and seasonal changes of tidal flats might have made it difficult for static media such as maps to capture the area clearly on paper. However due to improvements in geographical technologies in recent years, the job of those who create maps will be made easier.

Although it is good to have tidal flats noted on baseline maps, it is not common for tidal flats to be noted on ordinary maps such as Google maps and roadmaps, unlike other wetland ecosystems such as rivers, lakes, and beaches. Another big difference is that there are no names on maps for tidal flats, even on maps created by the Geospatial Information Authority of Japan. For example, Fig. 7.8 is the illustration created by the Environmental Office of Nagoya municipal office to show where Fujimae tidal flat is. However, the map created by the Geospatial Information Authority of Japan (Fig. 7.9) shows the area of tidal flat but without a name.

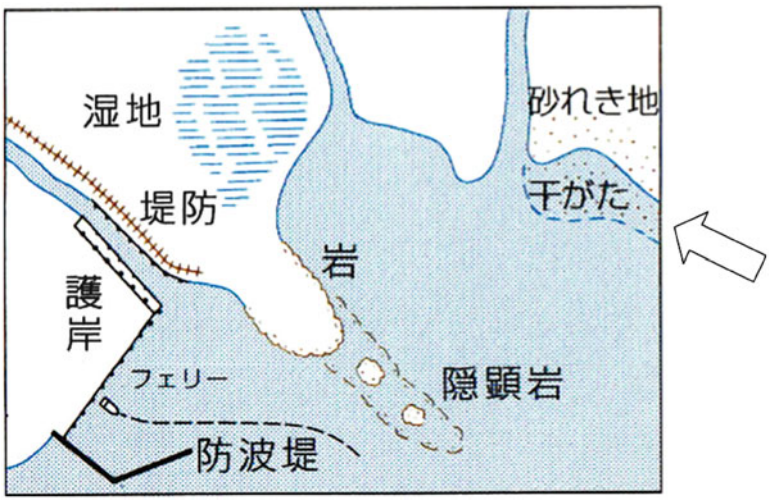

Fig. 7.7 Example of map legends set by the Geospatial Information Authority of Japan (1/25,000 scale, legend style set in 1986, the arrow shows how tidal flats are shown on the map)

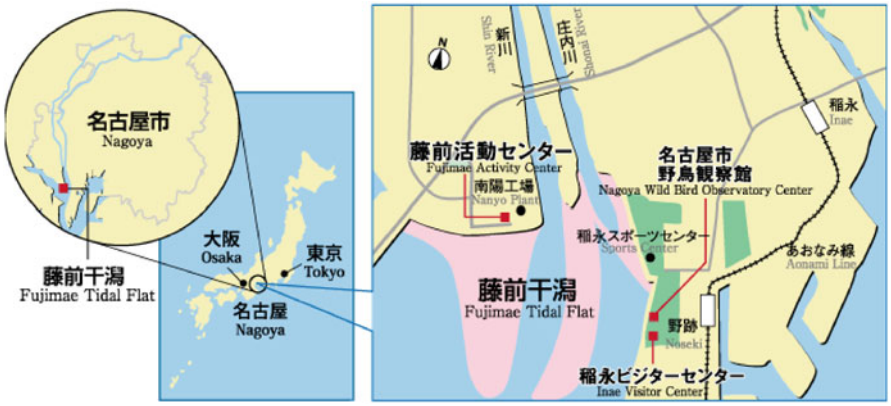

Fig. 7.8 Map of Fujimae tidal flat (Nagoya Municipal Office 2013)

When I asked the Authority the criteria for naming some graphic features such as mountains and rivers, an officer said that there is a noted instruction saying they must "name geographic feature when it is well known". Fujimae tidal flat in Nagoya city, Japan, is probably one of the most famous tidal flats in Japan due to the way citizens managed to overturn the municipal decision to turn the flats into a garbage dumping site. It is also one of the rare tidal flats which remains in a big industrial city in Japan. However, the officer said there is no instruction in their record standard [kisai kijyun] to name tidal flats, and it is not clear whether "being famous"

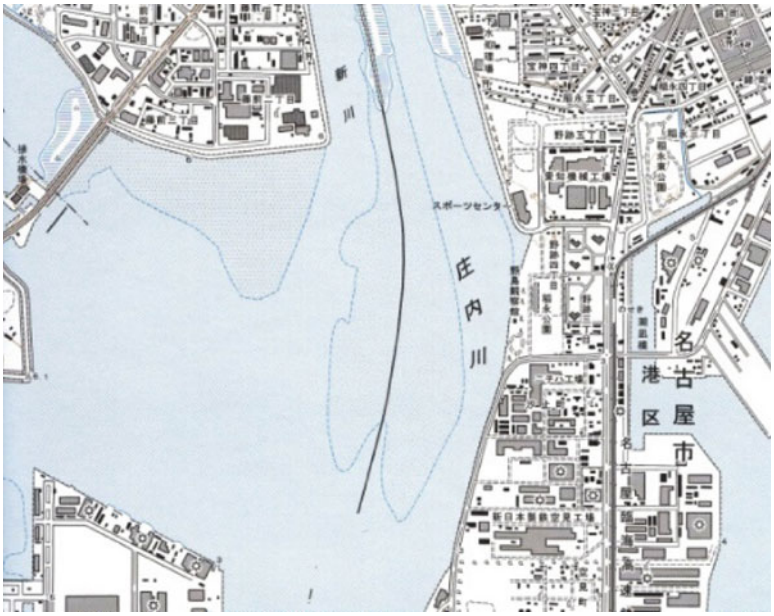

Fig. 7.9 Fujimae tidal flat from the Geospatial Information Authority of Japan (1/25,000 scale, topographical map "asuka" style updated in 2004)

qualifies it to be named on the map. The next important step for the Authority would be to note the names of tidal flats on maps just like other ecosystems such as mountains and lakes. When no name is included on the baseline data, there is very little chance that other types of maps which people can access more easily or purchase will name the tidal flats. Also to give a tidal flat a name that does not already have one would be a first step in helping people to at least note that there is a landscape under the sea which could be admired and conserved when it is out of the water. The concern is that without an identity, a tidal flat will not exist in the people and landscape planners' minds.

7.4 Implications for Invisible Tidal Flat Landscape Planning

So far, the previous sections of this chapter have looked at social perceptions of tidal flats, both in general and among some master's degree students; issues with existing tidal flat management arrangements, including unconnected management mechanisms for coastlines; as well as tidal flats being invisible on maps. The following discussion section looks at the implications of the above discussions for future landscape planning and decision making in terms of the three areas in particular.

Fig. 7.10 Citizens' map showing tidal flats and shallow areas of water (Oya 2005)

7.4.1 Making Landscape Planning Reflect Three Dimensions of Tidal Flat Landscapes and Their Daily and Seasonal Changes

As discussed previously, as long as tidal flats are invisible in people's minds and in documentation such as maps, designing landscapes which conserve tidal flat ecosystems will be more challenging. Even when a planner knows the importance of tidal flats, if they are not visible on the documentation, s/he will not be able to clearly negotiate their conservation. The conservation movement of the Fujimae tidal flat (now a Ramsar designated site) recognized this and started to name it the "Fujimae tidal flat" as no one knew what to call it (Chubu Regional Environment Office 2013).

When using maps and visual images for landscape planning or discussions with citizens, it is important for the meeting organizers to utilize three-dimensional maps to include areas beneath the water. Figure 7.10 is a map of Mikawa Bay drawn by an environmental network in the local area with the tidal flats in the Bay clearly represented to make people aware of their existence.

Figure 7.11 shows a map of Sanbanze tidal flat in the Chiba prefecture of Japan, and in this map one can clearly see the tidal flats (which are indicated in red) and shallow areas of water (which are indicated in yellow) (Sanbanze Restoration Planning Committee 2004). Shallow areas of water are the most productive areas of the ocean; with this kind of map it is clearly evident which part of the shore is to be protected. However during the field work between 2004 and 2008, apart from this

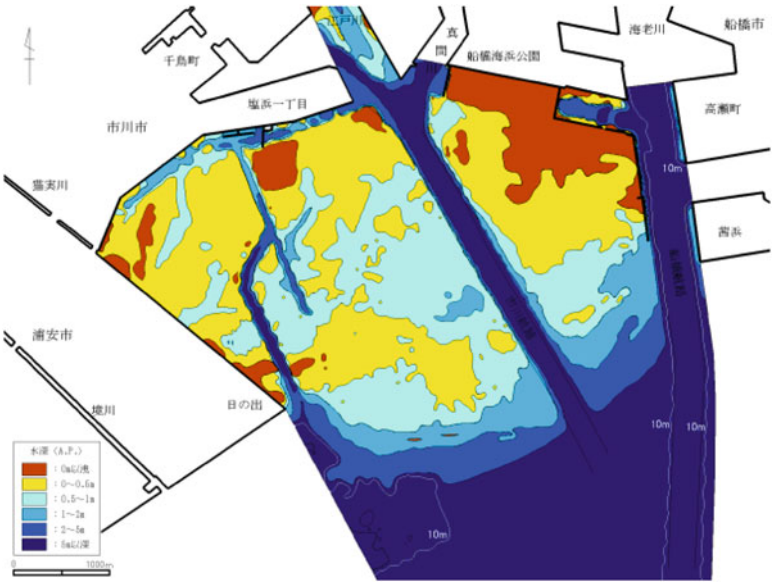

Fig. 7.11 Topographical map around Sanbanze tidal flat (Sanbanze Restoration Planning Committee 2004, p 32)

particular map, most of the maps I came across concerning the Sanbanze tidal flats were not three dimensional. Google Earth in recent years launched the "Ocean" program to show users three-dimensional images under the water for some areas of the sea. When putting together information for planning landscapes, one would need to be aware of three-dimensional landscapes under the water. There are different ways to sketch tidal flats that could even show varieties of tidal zones such as supra-tidal, inter-tidal, and sub-tidal zones.

As well as being aware of invisible features under the water, changes of landscape according to the time of day and the season also need to be noted. Since tidal flats are only seen twice a day, and during the winter the tide is not as low, they might not been seen for long periods. Awareness of tidal changes and three-dimensional thinking are crucial when planning tidal flat landscapes.

7.4.2 Creating Flows of "Joined-Up Thinking" Among Different Management Bodies for Tidal Flat Landscape Management and Planning

As discussed previously, coastal management is not linked across different departments at the moment, with different regulations and aims for coastline management. When planning to develop or conserve coastlines, there are different laws and

various stakeholders to deal with. There have been some local governments that have promoted Integrated Coastal Management (ICM) in recent years (Cabinet Secretariat Headquarters for Ocean Policy 2011), and these efforts are important to realise landscape planning for a sustainable environment. To make decisions on various issues concerning coastlines, ports, fisheries, leisure, and ecosystems, one needs to consider closely connected laws (e.g. Coast Act, Port Act, Fisheries Act, Water Pollution Control Act); their related plans; various management bodies, including prefectural and local governments; and stakeholders (e.g. citizens, fisheries authorities, leisure industries, and conservation organizations).

The fact that our coastal landscape planning is not linked is apparent just by looking at the size of the Ramsar designated sites along the coast. Japan has 46 Ramsar designated sites, 12 more than the number in Germany. However, each site in Japan is small; the biggest coastal site is Nakaumi (8,043 ha) while for Germany, it is Schleswig-Holstein Wadden Sea and adjacent areas (454,988 ha). The Fujimae tidal flat Ramsar site, as mentioned earlier in this chapter, is well known in Japan but is only 323 ha. When trying to designate a bigger site in Japan, issues of coordination among governmental and non-governmental stakeholders along the coastline emerge. Currently in 2013, the Basic Plan on Ocean Policy is under review. It is important for it to be upgraded to further enforce Integrated Coastal Management for sustainable landscape planning.

7.4.3 Making "Invisible Landscapes" Visible and Attractive to People, Decision Makers, and Landscape Planners

As well as including tidal flats on planning maps and naming them, there is another important challenge for the conservation of tidal flat landscapes: making them attractive to people, decision makers, and landscape planners. The importance of "Communication, Education, Participation, and Awareness (CEPA)" is well discussed in wetland conservation literature (Ramsar Convention Secretariat 2008; CBD and IUCN 2007); however, those who have been involved in CEPA activities concerning tidal flats might have to re-think their practices and hear what people who have no interest in tidal flats are thinking. The conventional ways of explaining the importance of tidal flats include explanations of ecosystem services and showing pictures of the living creatures that depend on tidal flats, such as mud skippers, crabs, and even human beings who fish or collect shellfish. I have also been doing these kinds of practice for a long time without questioning, and was therefore shocked to hear the comments from some of the media students who did not have an interest in tidal flats originally. They said they were not attracted to tidal flats since "Those animals are not cute at all. They are not fluffy." They mentioned that the images of tidal flats I was showing them were not attractive, and the more I showed pictures of tidal flat creatures, the more they were scared or disgusted by tidal flats. To a person like me, who is so familiar with the living creatures of tidal flats, they look appealing in their own way. That is the reason why I, and probably other tidal flat conservationists,

Marketing Product cone	Elements of tidal flat
1. Essence	Images,characteristics of products (personification: great, scary, beautiful, etc.)
2. Benefit	Something beneficial (ecological service, benefits to human beings)
3. Spec	Description of products, specs (places, names of living creatures and plants, ecology)

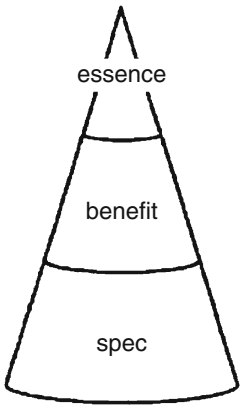

Fig. 7.12 Marketing product cone for tidal flats (after Mori 2006)

have never thought that I had been putting people off tidal flats in the past by negatively educating them.

People who would like to practice CEPA of tidal flats might need to reconsider the approaches they have been taking in the past. According to general marketing literature, there are three elements to be tapped into when one is trying to market a product. Mori (2006) explained this with a "marketing product cone" (Fig. 7.12). According to him, one element for marketing is "essence", which contains images and characteristics of a product (e.g. personification such as great, scary, beautiful). The second element is "benefit", which includes how that product is beneficial to you personally or to your company. For the marketing of tidal flats, this could include explanations of various ecological services and benefits which tidal flats bring to human beings and others.[3] The third element is "specs" which is a description of the products. This could include what a product is made of and explanations of how a particular new model is better than previous ones. For tidal flats, it would include explanations of the place, its ecology, and names of the living creatures.

[3] Note for "edible landscape": At the symposium, there was a discussion on the definition of a "good landscape". At the moment, there seem to be no clear definition of it, but one of the ways to define it could be that "a good landscape is edible". When I mean "edible" here, the meaning is very different from the "edible landscape designs" happening in Europe and Japan by using vegetables when creating gardens. What I mean is that the landscape is healthy and productive; it naturally provides things to eat and consume not only for humans, but for all kinds of living creatures including bacteria. When the landscape is in an extremely healthy condition, it does not need any human intervention to produce edible materials. For example, a healthy tidal flat provides "food" for different levels in the food chain, while a tidal flat in a "bad" landscape looks dead even when the mud itself is there physically. To me, a "good landscape" is one where births, deaths, production, consumption, and decomposition all happen and are completed within the area without or with very little artificial intervention. This definition of a "good landscape", for example, excludes artificial tidal flats, which often need to be re-constructed every several years, or artificial patches of green areas around houses created by housebuilders.

Looking at this marketing product cone, perhaps tidal flats and wetlands CEPA activities have been focused on "benefit" and "spec" elements, but not much on "essence" elements which make people have positive feelings towards tidal flats. When I worked with the media students at Nagoya University to create visual commercials for the tidal flats during 2011 and 2012, their work tended to mainly focus on the "essence" element, and did not explain the "benefit" or "specs" of tidal flats at all. During the creative process I was slightly worried not to be able to see any "benefit" or "specs" elements in their work, but what they produced was quite refreshing. Their ways might be better at communicating with wider groups of people who might not consider tidal flats or tidal flat creatures so attractive.

7.5 Conclusions

This chapter aimed to discuss the invisibility of tidal flats in documents, planning, and people's minds. At the international symposium held at Nagoya University (5th November 2013), on which this book is based, Prof. Bruns defined a landscape as "an area…as perceived by people". Hearing this definition made me worry for the future of tidal flats in Japan and in the world. If landscape planning and design shows "people's values towards their surroundings" and if they are influenced by "how people are talking about stories of the area" as mentioned in the symposium, tidal flat landscapes would cease to exist very soon. The fate of tidal conservation depends on how positively people perceive such areas now and in the future before they are destroyed completely.

Tidal flats are not alone; there are also other landscapes which might not be visible or only have appeal to those who have very close and direct experience of them. It is crucial for us to make those invisible landscapes visible in a variety of ways to the general public and decision makers to ensure future environmental sustainability.

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Chapter 8
A Prospect Toward Establishment of Basic and Clinical Environmental Studies by ORT (On-Site Research Training)

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Abstract The paper shows the challenge of tackling "On-site Research Training (ORT)" for establishment of "basic and clinical environmental studies." Concepts of synthesis and generalization are important for understanding environmental issues in the real world. Essential approaches are communication with real society and environment, and collaboration of researchers and students in various academic disciplines. These bring us new ideas, understanding of complex structures, and solutions to real problems. The concept of "Mandala" describing comprehensive composition on environmental issues should be produced as well as organization of methodologies supporting a clinical approach.

Keywords Clinical approach • Environmental education • Synthesis and generalization of related academic fields

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8.1 Introduction

How should universities and researchers be involved in environmental problems?

Of course, their approaches are naturally different, and there is no correct answer. Nevertheless, environmental problems are issues in the surroundings and boundaries ("environment" is "kan-kyo" in Japanese; "kan" means surrounding and "kyo" means boundary) of human society, and it is certainly essential to have an attitude to try to objectively understand what is happening there. The first requirement is to consider and implement the approach necessary to identify problems in the field and the solutions to them.

In reality, people often criticize universities, saying for example that they regard local areas just as test grounds or guinea pigs, that they only exploit and leave the field or that it is meaningless to present armchair theory with jargon. Such criticism indicates lack of effective communications of universities and researchers with local communities through their academic activities. In some cases, on the other hand, researchers who place too much focus on contribution to solving local problems receive comments that their acts are nothing more than those of consultants and that their activities are not scientifically or academically verified for generalization and will therefore not be accepted by academic circles.

Through such activities, universities and researchers tackle environmental problems and make use of their advanced and leading-edge knowledge practically to help solve the problems. Still, these activities do not contribute at all to the ultimate goal of providing feedback for academic and technological development that can be applied more generally.

Aiming to establish a methodology for meeting the goal, a Global Center of Excellence (COE) Program "From Earth System Science to Basic and Clinical Environmental Studies" (FY2009 to FY2013, http://w3serv.nagoya-u.ac.jp/envgcoe/index.php) is currently promoted at Nagoya University mainly by the members of the Graduate School of Environmental Studies and the Graduate School of Bioagricultural Sciences, including the authors. This paper describes the concept of "basic environmental study" and "clinical environmental study," which are discussed in the program, as well as the background that has generated the studies, and mentions "on-site research training (ORT)," which is an effort to put them into practice.

8.2 Environmental Studies as an "Integrated Science"

Science is called "ka-gaku" in Japanese, meaning the studies ("gaku") of disciplines ("ka"). Accordingly, science has been developed to enable detailed analyses in segmented disciplines (although "science" in English or "scientia" in Latin has no such meaning). As a result, while science can provide effective solutions when it is assumed that the discipline is limited by boundaries, there is no guarantee that the assumption is effective in real society or that the solutions are suggestive for real society.

In fact, environmental problems are related to every discipline, and the scientific approach is taken separately from each discipline. Most of the proposals based on such an approach are only fragmentary and are not always useful for the identification and solution of problems. It is also possible that they are inconsistent or contradictory to each other. The public and governmental agencies that look for solutions to environmental problems seek effective suggestions for the problems, but they are not interested in the "discipline" to which the researchers belong or have no capacity to examine how effective the comments of the researchers are.

With such recognition, Nagoya University established the Graduate School of Environmental Studies in April 2001, aiming to combine the humanities and sciences to tackle the situation straightforwardly. Environmental studies are a comprehensive academic field, and their philosophy is to combine the analyses fragmented into different disciplines in order to understand and address the mechanism of extensive and complicated environmental problems. The "combination of the humanities and sciences" is the term that represents the philosophy, but various discussions conducted in the process to establish the Graduate School accidentally revealed that no mutual understanding or cooperation existed between the humanities and sciences or even among each of the two fields. This led to the recognition that there would be no substantial contribution to solving environmental problems without breaking the existing disciplines although some also claimed that the existing disciplines should not be neglected as a result of too much focus on efforts to address such a challenge.

Eventually, it was decided that the faculty members moving to the Graduate School of Environmental Studies follow conventional disciplines and maintain ties with the previous departments when involved in undergraduate education (referred to as vertical structure), but try to collaborate with other disciplines in the Graduate School (referred to as horizontal structure). At the same time, two collaborative research projects of "sustainability study" and "safety and security study" were prepared based on the horizontal structure, and efforts have been made to address environmental problems through the combination of various disciplines. With respect to the sustainability study, which is a subject of this paper, a wide range of efforts have been made to primarily address so-called global environmental issues such as climate change and biodiversity, but the subjects were so diverse that the Graduate School could not focus its activities on specific issues. The central problem was difficulty in effectively combining the approaches in engineering such as understanding the mechanism of global environmental issues based on scientific approaches with those in humanities/social studies such as relationships between the issues and human society and the examination of solutions for them.

8.3 Basic and Clinical Environmental Studies

Based on the awareness of such issues, this Global COE Program succeeded the previous twenty-first century COE Program developed through cooperation between geoscientists and the Graduate School of Bioagricultural Sciences called

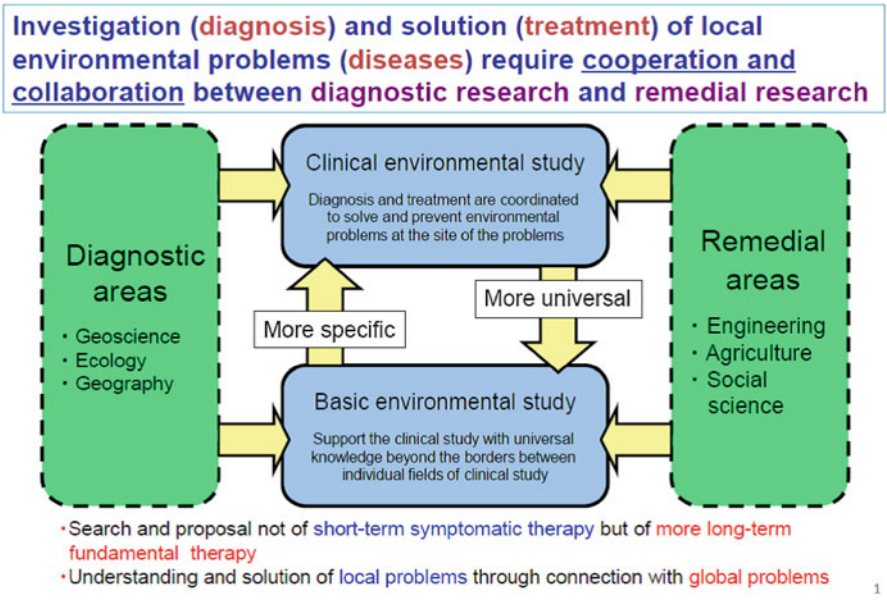


Fig. 8.1 Vision and objectives of Nagoya University Global COE Program "From Earth System Science to Basic and Clinical Environmental Studies"

"Dynamics of the Sun-Earth-Life Interactive System" (FY 2003 to FY2007, http://www.selis.hyarc.nagoya-u.ac.jp/21coe-selis/), and added researchers in the fields of engineering (e.g. civil engineering, architecture) and humanities (e.g. geography, sociology, psychology) to the members to form an interdisciplinary structure. The research field was narrowed from the entire earth to small areas in order to explore relationships with the local communities. A watershed was selected as the unit of the areas, which is a rather closed system from the viewpoint of the cycle of the natural environment.

The structural outline of this program is illustrated in Fig. 8.1. As the title indicates, the objective is the creation of "basic environmental study" and "clinical environmental study." A main feature of the program is the declaration of involvement with clinical fields, in which efforts are made to reach out to the subjects, such as medicine, education and counseling.

A concept that "the role of sciences and learning is to explore the truth" is often misunderstood as that universities and researchers should stand aloof from the actual conditions in the field to see things objectively. Such an approach would not lead to the understanding of environmental problems, which occur not in the laboratory but in the field, in a real sense. In fact, many researchers take the position that they do not intend to understand real environmental problems but to handle idealized subjects. This is not, however, appropriate for environmental studies. It is also necessary to recognize that society expects universities and researchers to reach out to the field and work to improve it. This requires the understanding that efforts to

generalize the methodology for performing activities to understand environmental problems and reach out to them in a scientific and rational manner can be an academic field by itself and the establishment of the methodology can help solve problems in every part of the world. This is why the term "clinical" is included.

The classification of environmental studies into "clinical" and "basic" can be described using the analogy with medicine. When the malfunction of the geobiosphere caused by human activities is likened to diseases of a human body, environmental studies should be medicine that addresses the diseases. Conventional environmental studies, however, have separated research in diagnostic fields to analyze the mechanism of the geobiosphere and its relationships with human society (e.g. geoscience, ecology, geography) from that in remedial fields to develop technical and institutional solutions to environmental problems (e.g. engineering, agriculture, social science) with almost no interaction, and developed various disciplines that constitute each of the two types independently. As a result, environmental studies have lacked the systematic efforts equivalent to clinical medicine, in which people from a wide range of related disciplines cooperate to provide medical care in the site of the problem.

The "clinical environmental study" will organize a series of practical efforts (practical sciences) ranging from diagnosis of diseases that threaten the sustainable relationships between people and nature to appropriate prevention and treatment of the diseases and the prediction and prevention of side effects of the treatment, covering a wide range of areas in Japan and other countries. The "basic environmental study," on the other hand, will examine the diseases that harm the sustainability of human society in the geobiosphere in a comprehensive manner and sort out the effects and problems of the technical and institutional approaches to the diseases in order to establish a system that provides a universal and global viewpoint as a supporting base for the clinical environmental study. The clinical and basic environmental studies are the two wheels of a vehicle to tackle environmental problems and also serve as the core in the integration of existing environmental studies.

Think of a situation that you go to the hospital because you have a headache. A general hospital has many clinical departments, and you have no idea which department you should consult unless you are familiar with medicine. In such a case, it is much easier if you go to a medical clinic in the neighborhood. The physician examines you and, if necessary, conducts various tests to diagnose the headache as a symptom of a cold or a serious brain disease. Then, if the latter is suspected, you will receive a referral letter to the department of neurosurgery at a general hospital, and undergo detailed examinations and treatment there. In case of diagnosis of the former, you will receive a prescription of an analgesic. The adequacy of such diagnosis, treatment and prescription is endorsed by various research and development activities and therapeutic trials to study the mechanism of headaches and develop drugs and treatment that inhibit them. These activities support clinical medicine.

Such a system has not been formed in environmental studies. Each discipline promotes research activities independently with no methodology to examine the patients to identify their problems comprehensively from a panoramic viewpoint established. There is little accumulation of treatment and prescription or an insufficient number of clinicians.

8.4 Description and Importance of ORT

In consideration of the situation, this program especially focuses on ORT. The term ORT comes from OJT (On-the-Job Training, education and training to learn necessary skills, abilities, knowledge, attitude and values through actual work experience). In the target regions in Japan and other countries (Japan (Ise Bay Bioregion), China and Laos have been designated in this program), a group of teachers and students from different disciplines is formed to participate in a series of efforts to identify, survey and solve specific environmental problems and propose measures in a practical manner. The students participating in the program earn credits of the class subject called "Clinical environmental study training." In the 6 month class, students engage in the processes of: (1) preliminary discussion on the campus; (2) compulsory field trips and setting of themes; (3) theme-based surveys by individual groups; (4) diagnosis of the problems and proposal of prescriptions to solve the problems; and (5) presentation of the prescriptions in the field. The outline of the ORT conducted for the Ise Bay Bioregion in FY2011 is illustrated in Fig. 8.2.

As the areas of specialty are diverse among the participants, their approaches to the survey and analysis of the subjects are also wide-ranging. Some have experience of only the research activities that involve no field surveys in an extreme case. The participants in ORT go through the method of identifying specific conditions in the field through communications with local people and implementation of various

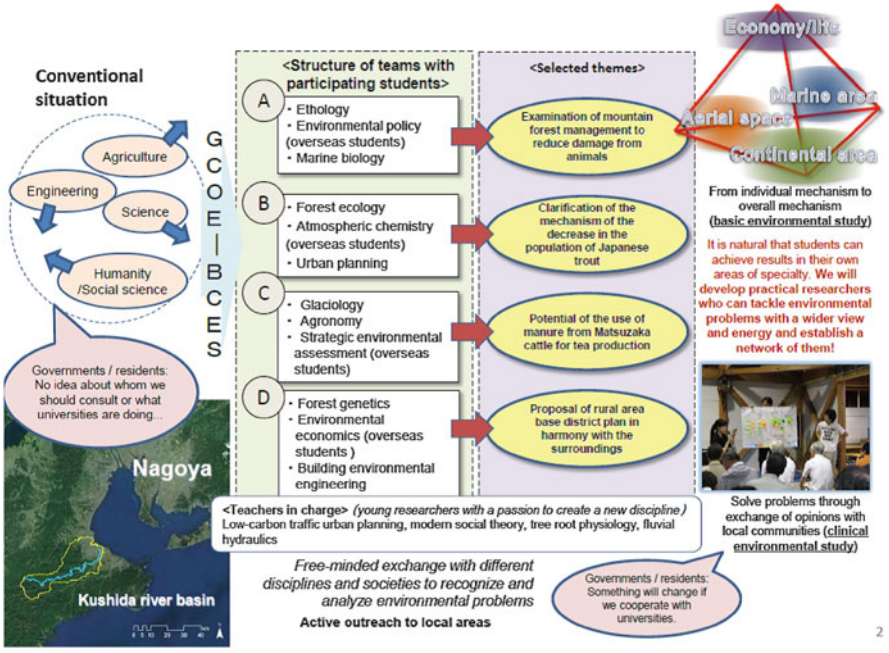


Fig. 8.2 Outline of ORT in Ise Bay Bioregion in FY2011

investigation and observation methods so that they can improve their understanding of the environmental problems of concern while learning the techniques to identify and solve problems in cooperation with members from different disciplines in a practical manner. It is also hoped that they learn the complexity of the overall structure of environmental problems and the difficulty of understanding and solving them and consider the relationships of the problems with their own research subjects.

There is a good chance that the participants have no prior knowledge about the target local area or no opportunity for handling environmental issues related to their areas of specialty. In fact, such a situation happens in actual work on a routine basis, and it is a precious experience to face it. The students participating in the ORT are expected to become excellent researchers such as leaders of integrated research projects in environmental studies or those who play active roles in real society and open up a new world such as international environmental practitioners, environmental engineers, environmental officers in governments and companies, politicians and entrepreneurs in the future.

ORT can also trigger the launch of research on the problems that can be solved through combination of different disciplines, or give tips to ongoing research activities, and such cases have already occurred several times. Universities can develop relationships with local communities by identifying the problems that have not been identified by local people and proposing solutions to them. In the first place, just as self-health management is effective for the prevention and treatment of diseases, active involvement of local people is effective for the understanding and solution of environmental problems.

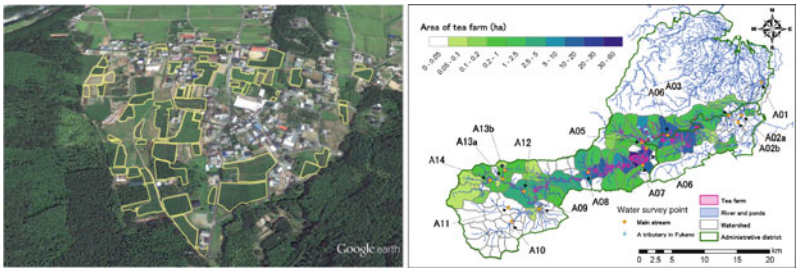
The ORT of a group consisting of diverse members highlights the fact that people see a thing, such as a river for example, in various ways depending on their areas of specialty. This provides intellectual inspiration, as well as collaboration that is more than just a collection or accumulation of people from different disciplines, leading to a panoramic understanding of environmental problems. To illustrate this structure more specifically, it is important to identify the links and causal relations between the elements constituting the environment and clarify how they are connected with various environmental issues. This is exactly the outcome of basic environmental study. We call this structure “Mandala,” which is a visual and symbolic representation of how Buddhism sees the world and the universe.

8.5 Example of Onsite Research Training

The targets of the ORT program are not limited only to issues on landscape planning and design, but related to wider issues of regional sustainability. But many studies are deeply related to landscape issues. In this section one good example of the ORT student’s studies in 3 years is shown.

This student’s study shows the possibility of the combination of tea cultivation and cattle dung for the improvement of the sustainability of the Kushida river basin. This study aimed to reveal how the local cyclical agriculture can be used to adapt to

Tea farming and fertilizer use in the Kushida River basin



Spatial distribution of tea farms

Methods;

- Delineate all tea farms in the Kushida River basin on Google Earth™
- Analyze the areal distribution of the tea farms Results;
- Tea farm distribution is not uniform.
- The tea farms are namely concentrated especially in the middle reaches.

Fig. 8.3 Tea farm delineation using Google Earth images and tea farm distribution and water survey points

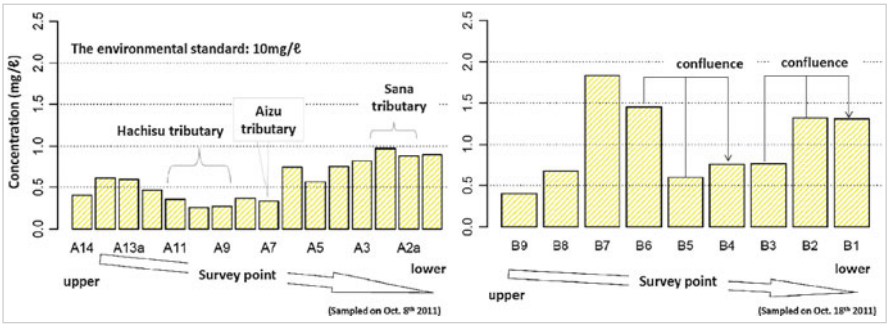
and fully accommodate the local condition of the Kushida river basin in Mie prefecture, Japan (Fig. 8.3).

The Kushida river basin is very famous as a production area of Japanese tea, "Ise Cha." Generally, compared to cultivation of rice or vegetables, cultivation of tea requires more nitrogenous fertilizers. This gives rise to the problem of eutrophication, leading to the leakage of a large amount of nitrogen ingredients into the river when it rains.

This area is also very famous for the raising of high-quality beef, "Matsusaka" beef. Although cattle dung is always discharged from the cattle farms located in the area and is used as compost for rice fields, its amount is far less than the amount of chemical fertilizer used in this area. This student's study proposed to change this compost into a liquid form (liquid fertilizer) more suited to the tea cultivation. The proposal aimed to find an efficient way to decrease the outflow of nitrogen of the area in total.

After investigating the amounts of supply and demand of liquid fertilizer through conducting various experiments such as component analysis, and image analysis of the tea farms, it has become clear that the nitrogen ingredient obtained from the liquid fertilizer is enough to meet the needs of the tea farms of the valley (Fig. 8.4).

Furthermore, through interviewing farmers and conducting a water survey, the fact that the liquid fertilizer has the potential to contribute to the mitigation of problems associated with the labor force required for the management of tea farms, is clarified. Not only the need for the labor force would be reduced, but also the overall cost would also be reduced (Fig. 8.5).



Water survey on nitrogen

Methods;

- Collect water samples from the Kushida River
- Analyze dissolved nitrate-nitrogen concentration by an auto-analyzer, QuAAtro-2ch (the Bran+Luebbe Co., Germany)

Results;

- All data are within the range of the environmental standard in Japan of 10 mg/ℓ.
- Largely increasing profiles to the downstream are recognized.
- Large values near many tea farms are recorded.

Fig. 8.4 Water survey points in a tributary in "Fukano" and dissolved nitrate-nitrogen concentration in the Kushida River system

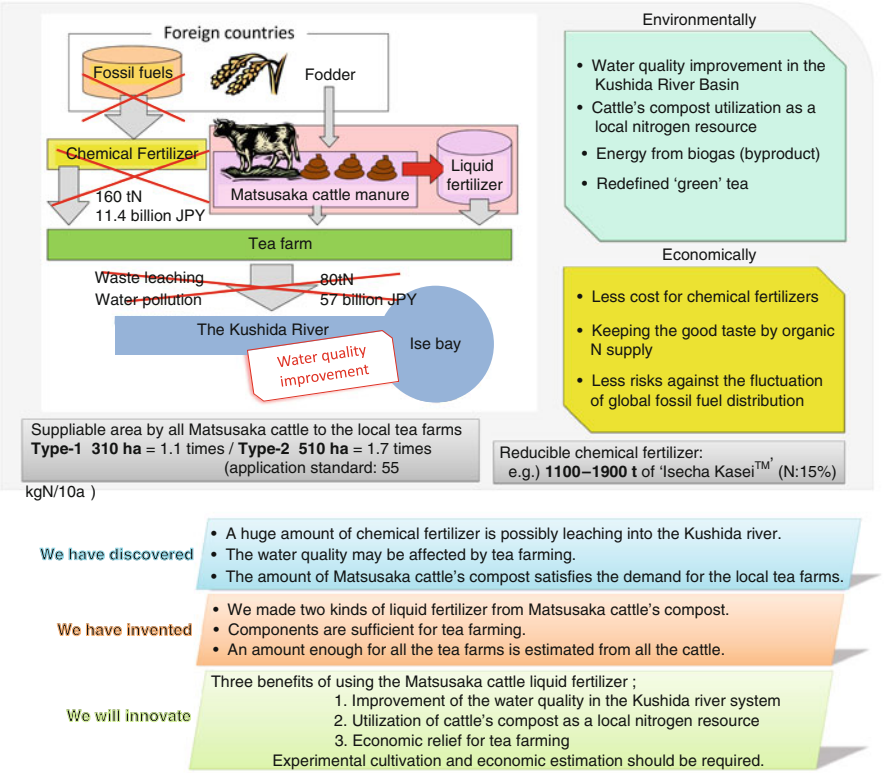


Fig. 8.5 Possible benefits on the local sustainability

Carrying out this project involved various difficulties. Participants in the research had different academic backgrounds. Therefore a considerable amount of time was devoted to reaching a common research framework understandable for all members of the team. However, the work was promising in the sense that innovative ideas have been discussed during the process.

In summary, it can be said that ORT is a useful approach that can be used in the graduate schools to enhance the abilities of students to conduct cross-disciplinary research.

8.6 Conclusion

In this Global COE Program, teachers and students from various areas of specialty experience a process of surveying and analyzing actual environmental problems together in a same field and proposing solutions to the local communities so that they learn a wide range of methodologies and understand the environment from a

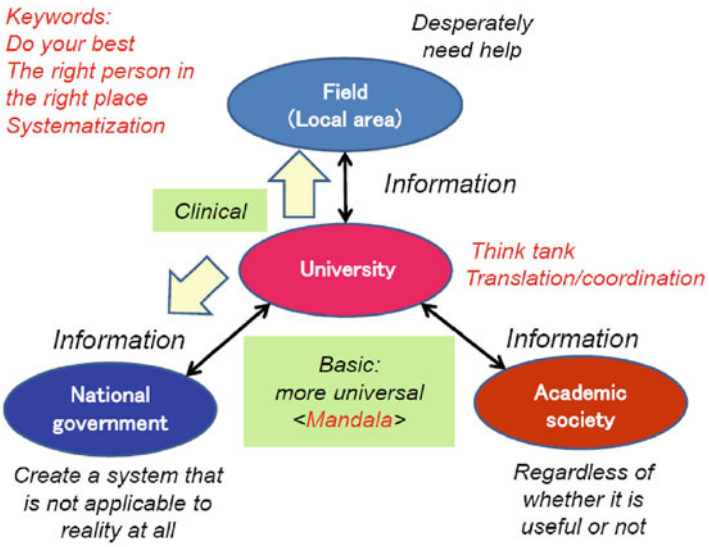


Fig. 8.6 Blueprint of the social contribution of universities through the establishment of basic and clinical environmental studies

panoramic viewpoint. The former is clinical environmental study and the latter is basic environmental study.

Clinical environmental study is a methodology for communications with the environment and society including investigation, analysis and the proposal of measures. On the other hand, basic environmental study aims to clarify the complete structure (Mandala) of environmental problems and identify the relationships between various disciplines and elements. Consequently, as shown in Fig. 8.6, universities can help local communities, academic societies and national governments understand environmental problems more accurately and promote efforts to discuss and implement remedial measures. A major future task for realizing it is to earnestly promote the organization and systematization of a specific methodology to establish clinical environmental study and the creation of the Mandala that establishes basic environmental study through cooperation between researchers from different disciplines.

Acknowledgment Figures 8.3, 8.4 and 8.5 are created by Hiroto Nagai, Chihiro Aoyama, and Ayyoob Sharifi, Graduate School of Environmental Studies, Nagoya University (ORT team-C/Ise-bay bioregion research)

Part IV
Conclusion

Chapter 9
New Development in Landscape Planning: Report of the Germany–Japan Symposium and Suggestions on the Research and Practice to be Conducted in the Future

Hiroyuki Shimizu, Akito Murayama, and Kohei Okamoto

Abstract Issues on clinical environmental approach in multi-scale, participatory landscape planning can be summarized in the following four points: (1) Regional Landscape Planning System, (2) Local-Scale Landscape Planning and Design Methodology, (3) Science and Technology, Education, and (4) Institutional Innovation.

Japan is desperately in need of regional initiative, and there are many things that can be learned from German experiences:

- Grounds of regional landscape planning: What is the engine? Watershed is one logical unit to think regionally.
- Planning process: coordination between municipalities within a region, participatory approach possible?
- Other questions from Japan to Germany

There are issues regarding local-scale landscape planning and design methodology:

- Target area: small enough to be specific (not abstract) with good understanding of regional context—Are there approximate range?
- Working with various stakeholders of society—Who should be involved? Issue of the "silent majority" and outreach
- Role of experts—What kinds of experts with what kinds of information (data: current condition and future forecast, proposal, etc.) and expertise? Making

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"Mandala": interconnected elements of landscape, science communication, visualization of the invisibles
– Process design: long enough for discussion, short enough for concentration—Is there an universal model?

The following issues are related to science and technology, education:

– People's perception of landscape
– Scientific analysis of geography, soil, vegetation and water
– GIS to organize detailed (site-scale) information and to think in different scales.
– Education: onsite research training, workshop, methodology

Finally, there are institutional innovation issues:

– Land and water management system (legislation)
– Governance system—regional and local
– Leadership—city mayor, community leader

Keywords Clinical environmental approach • Institutional innovation • Methodology • Multi-scale • Participatory

9.1 Clinical Environmental Study and Bio-Web City Study Group

The Nagoya University Graduate School of Environmental Studies and Graduate School of Bioagricultural Sciences have developed the Global Center of Excellence (COE) Program "From Earth System Science to Basic and Clinical Environmental Studies" (FY2009 to FY2013), which aims to establish "clinical environmental study" by systematizing a series of practical efforts from the diagnosis of environmental problems threatening sustainable relationships between people and nature to the appropriate prevention and treatment of them and to the prediction and prevention of side effects of the treatment, as well as to develop "basic environmental study" by generalizing the comprehensive understanding of environmental problems and technical and institutional responses to them, which support clinical environmental study. Here, the two environmental studies are compared to "clinical medicine" and "basic medicine" in medicine. One of the subjects of clinical environmental study in this program is the Ise Bay Bioregion around Nagoya (the watershed of the rivers flowing into Ise or Mikawa Bay).

The landscape in which we live is created as a result of interactions between the activities of various actors including the constituents of the natural environmental such as the air, water, soil, fauna and flora as well as the creators and users of the built environment such as residents, land owners, business operators, companies, governments and NPOs. From a panoramic view, landscape is constantly changing like a living creature. Landscape planners and designers work for the planning and management of the ever-changing landscape to maintain good conditions. Involved in

the diagnosis, prevention and treatment of diseases (problems) related to landscape and the prediction and prevention of the side effects of the treatment, the planners and designers can be regarded as "doctors for landscape." Landscape planning serves to integrate different activities on the creation of landscape in a spatial and temporal manner. Bio-Web City Study Group (representative: Hiroyuki Shimizu, organizer: Akito Murayama), which plays a part in the clinical environmental study of the Ise Bay Bioregion, examines new development in such landscape planning. The term "Bio-Web City" is used to mean a "city incorporating nature" and differs from a compact city, in which the urban and rural areas are clearly divided. The study group particularly aims to comprehensively establish systems, methods and techniques for plans to seek a shift from the traditional urban structure that erodes and removes nature to a new urban structure incorporating nature, in the areas stretching from urban areas to mountainous area in the vicinity of villages (*satoyama*).

On November 5, 2012, under the initiative of the members of the Bio-Web City Study Group, German and Japanese researchers gathered at Nagoya University to attend the Germany–Japan Symposium "Seamless Connection of Landscape Planning and Design from Regional to Site Scales—The Cultural Context," which was co-sponsored by the Nagoya University Global COE Program "From Earth System Science to Basic and Clinical Environmental Studies," Graduate School of Environmental Studies, Nagoya University and Chubu Branch of the City Planning Institute of the Japan.

A brief report of the symposium is presented below. We have to comprehensively understand our living space in order to tackle environmental problems such as global warming, population change, energy crisis and loss of biodiversity. In the symposium, German and Japanese researchers gave lectures and had discussions on the concept of new landscape planning and design based on the cultural context that covers various space scales ranging from regional to site scales, and handles the living space and activities of human beings and nature in a comprehensive manner.

The morning sessions included the lecture of Professor Diedrich Bruns (University of Kassel) on the value that people give to cultural landscape and their surroundings as well as the lecture of Professor Mikiko Ishikawa (The University of Tokyo) on the trend of landscape design in Japan. Then, Professor Kohei Okamoto (Nagoya University) provided comments on their lectures from the perspective of geography.

Professor Bruns firstly defined landscape as "what people give value to in their surroundings" and indicated that landscape is a cultural phenomenon composed of the three elements of nature, artefacts and social organizations. Here, "nature" means all that exists and develops without human intervention and "artefacts" represent all physical/material things that exist/are created as a result of human intervention while the "social organizations" of spaces and places are common understanding of laws, orders, customs, traditions and other social acts. He also introduced the definition of landscape in the European Landscape Convention, which is "an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors." Then, citing several cases, he claimed that in the planning of any landscape, answers have to be always given to the

questions about who defines the landscape in technical and public terms, how experts collectively prepare a list of landscape resources and how people share the qualitative targets and values of landscape.

Professor Ishikawa explained the historical transition in the perception of landscape in Japan. Referring to the cases of Tokyo, a big city, and Kakamigahara, a local city, as well as recovery from the damage of the Great East Japan Earthquake and Tsunami, she indicated that the adoption of watersheds as a framework in the planning concept, the development of ecological planning and the realization of design through public involvement recently emerged as new trends in landscape planning in Japan. Then, she claimed that it is important to develop a database and conduct simulation for the consideration of multiple alternatives in big cities, to identify resources and implement design with public involvement in local cities and to examine the future vision based on landscape planning in disaster prevention and mitigation measures.

Professor Okamoto explained how landscape was translated in the history of Japan with focus on the Japanese words “keikan” and “fukei.” He also introduced the Landscape Act enacted in 2004 in Japan, and indicated its characteristics such as no definition of landscape or “good” landscape, distinction between landscape and land use and emphasis on the “creation” of landscape. Referring to the Act on the Promotion of Nature Restoration, which was enforced in 2002, and geographical studies, he also raised the questions of what state is “natural” in the first place and how the history of places should be treated in landscape planning.

Afternoon lectures were given by Assistant Professor Hirofumi Ueda (Sapporo City University), Professor Hiroyuki Shimizu (Nagoya University), Associate Professor Hirokazu Kato (Nagoya University), Associate Professor Takashi Tashiro (Nagoya University), Associate Professor Hiromi Yamashita (Nagoya University) and Associate Professor Hisako Koura (Osaka University) on such subjects as landscape perception, diversity and relevance of the problems, sequence from the standpoint of rivers, decision-making and challenges and potential of the law system. In particular, Associate Professor Koura mentioned that landscape planning based on the Japanese Landscape Act is an important system that provides local governments with opportunities to comprehensively control and manage spaces from the perspective of sustainability.

Lastly, under coordination by Associate Professor Akito Murayama (Nagoya University), a panel discussion was held with the participation of all of the lecturers. The first topic was the need of efforts based on a wider area such as a watershed in Japan. While various efforts have been made concerning landscape formation on a local level in Japan, such efforts have not always been successful on a regional level. A discussion was therefore made about how regional planning should be developed in conjunction with landscape planning. Professor Ishikawa pointed out that regional planning has been implemented since the 1930s in Japan but the position is still weak even now and the legal foundation to conduct regional and municipal plans in an integrated manner is not firm. In response, Professor Bruns explained regional planning in Germany as mentioned below.

While the Federal Government of Germany has a system that guides regional planning, the 16 states independently formulate and develop their own policies. Each of the states is divided into several regions, and the regional plans are continuously developed in a relatively successful manner. Technologies to facilitate efficient development of the plans, such as Geographic Information System (GIS), have also been introduced in recent years. Such regional plans are promoted mainly for two reasons. One is that regional plans are important for strategic decision making in the era of depopulation, and the other is that the EU strongly requests Germany to promote regional plans. For feasible regional plans, participatory planning is important, and it is necessary to pay attention to the process. Regional planning in Germany consists of comprehensive planning and landscape planning. These two types of planning work together; landscape planning is integrated into comprehensive planning, or the two types are developed in parallel. However, not surprisingly, these plans are not developed in a perfectly efficient manner.

Responding to it, Professor Ishikawa asked what happens if there is any contradiction between comprehensive planning and landscape planning, and Professor Bruns answered that conflicts always exist and they are unavoidable.

Professor Shimizu referred to the lack of a robust integrated regional planning system in Japan, and asked him to give any suggestions about it. Professor Bruns responded with the following comments: Planning on a regional scale is effective for issues such as watershed management and climate change actions. Landscape characters also have regional-scale features, and are handled successfully in the UK and Scandinavian countries. Italy and France also develop on-demand regional planning. In Germany, its strict bureaucratic system is a disadvantage for on-demand planning.

As an expert of public transportation planning, Associate Professor Kato mentioned collaboration and cooperation between different local governments in the planning of local bus routes. He has been involved in the efforts to propose and establish an integrated system of bus routes of multiple local governments, and claimed the effectiveness of local planning in the efforts.

Associate Professor Tashiro is researching the river ecosystem. While he is trying to find a way to introduce the concept of ecosystem into a planning system, he feels that governments are still not positive enough. Nevertheless, he also mentioned that central and local governments began to be aware of the need to improve the river ecosystem in recent years.

Associate Professor Koura asked Professor Bruns about how the boundaries of a region are defined and determined. Answering to it, Professor Bruns commented as follows: The definition is different depending on the individual and regional context and made in different ways between regions and countries. For example, the definition of a region based on a watershed is new and has not been adopted widely yet. However, irrespective of the definition, connectivity with the local level is significant.

Professor Ishikawa claimed that landscape planning has the three important principles of area, structure and dynamism and it is crucial to incorporate the importance of landscape planning in plans.

Referring to Associate Professor Koura's comment that the Landscape Act in Japan mentions "good" landscape, Professor Bruns asked what is the definition, and Associate Professor Koura answered that a good living environment is important in Japan and can be used as a good reference.

Associate Professor Yamashita asked Professor Ishikawa about how structure and dynamism should be balanced, and Professor Ishikawa gave the following answer: While structure is static, good landscape design is dynamic and may be the design of temporal or seasonal changes. Dynamism, or the capacity of landscape design to introduce the concept of dynamism, is an important element. Planning and design should be connected seamlessly but should also have individual methods.

Assistant Professor Ueda mentioned that the Japanese word "fukei," meaning landscape, also represents "view" so the area within a view can be defined as a region.

Associate Professor Koura commented that when she surveyed the favorite landscape of local people with her students after the Great East Japan Earthquake, she told the students that many residents had indicated mountains as an indicator of the direction, and the students could not understand it, claiming the importance of understanding preconceptions among local people.

Associate Professor Murayama also shared his experience in Nagoya. When he asked local people about what they perceive as a "townscape," many of them said their own buildings, which was different from what he perceives. Associate Professor Murayama mentioned that his perception may be different from that of local people because he is a city planner.

Then, Professor Bruns pointed out the difference underlying the mental maps of individuals and the need to pay attention to the individual stories behind the respective mental maps. He also claimed that experts should play a role in leading the process and creating the platform to introduce various perspectives into it.

Thus, the session presented arguments on the setting of the scope in landscape planning and design on a district scale, the challenge of participation of multiple actors, roles of experts, process design, science, technology and education to support efforts on multiple scales and institutional reform, and involved very active and cross-sectional discussions.

9.2 Suggestions on the Research and Practice to be Implemented

The theme of the symposium was "Seamless connection of landscape planning and design from regional to site scales—The cultural context." The symposium also aimed to explore how the establishment of basic and clinical environmental studies, which is the primary subject of the Global COE Program mainly promoted by the Graduate School of Environmental Studies, Nagoya University, can be developed in the field of landscape planning and design.

Through the international symposium, we learned that in order to address global warming, depopulation, the deteriorating ecological environment and other issues, it is crucial to establish on-demand regional plans that respond to the challenges

while understanding local people's recognition of landscape, etc., as their perception and paying attention to its diversity, and to connect those plans seamlessly to the plans of the respective local areas and districts. We also realized that this requires universities to establish a system to connect research areas of various disciplines in a cross-sectional manner and meet the specific demand from the field, as well as to cultivate the human resources that can materialize it.

Our Global COE Program provides on-site research training for Ph.D. students to cultivate such human resources. The experience has taught us the significance of comprehensively identifying all problems in a region and understanding the relationships between the problems. We use a Buddhist term "Mandala" to explain them. Put simply, Mandala illustrates the relationships in the world or the universe. It can be regarded as a sort of landscape planning on a philosophical level. We consider that it is important to see the Mandala and presume various causal relationships as a chain. We call it the "hypothesis chain."

An example of the hypothesis chain is as follows: When an economy enters into a period of high growth, it causes the rapid concentration of population into urban areas. This leads to a shortage of land for housing development in the urban areas and skyrocketing land values. To address the situation, rural, hilly and forest areas around the urban areas are cultivated to construct residential districts, which increases population in areas surrounding the city. While this results in skyrocketing land values in areas surrounding the city, landowners compete to promote transformation of their agricultural land, mountain forests and wilderness areas, the values of which are still comparatively low, into land for housing to earn real estate income. In such areas, as the public transportation system is underdeveloped in comparison with urban areas, people depend more on private cars. Targeting such customers, large-scale retail stores are located in suburbs, where it is easy to secure a large block of land. In addition, suburbs attract the facilities that provide jobs such as factories that expect to employ young workers. Then, commercial districts in urban areas lose their abilities to attract customers and the shopping streets decline. In the meantime, young people who were born in urban areas move to suburbs, which leads to the further aging of the population in the urban areas. This is accompanied by a decrease in the population of children going to elementary and junior high schools in the urban areas, which generates the need for the consolidation of the schools. This further robs the cities of vitality. The loss of vitality in the cities leads to a decline in land prices and a decrease in the value of the assets for the revitalization of the cities. Then, the renewal of buildings and commercial and business activities further slow down in the urban centers. On the other hand, suburbs frequently see uncontrolled overdevelopment, which results in the collapse of various ecosystems that have supported Japan such as forest areas, rice fields and other farms around urban areas. Such a chain of phenomena is imagined in the hypothesis chain.

Another example of the hypothesis chain is about hilly and mountainous areas. As life in hilly and mountainous areas is tough and lacks cultural stimuli, young people there yearn to live in cities. No educational environment or high education institution is available in hilly and mountainous areas. Consequently, young people move to cities after graduating from junior high schools with only elderly persons left in the areas. Elderly persons do not have sufficient physical strength to manage

farms and forests. As a result, farms are abandoned, which leads to an increase in deserted arable land. Forests are also left untreated because forestry management is not attractive anymore due to the low prices of domestic lumber in face of tough competition from imported lumber. Then, the environment for wildlife also deteriorates, and this, in addition to the location of houses that is too close to the environment for wildlife, leads to more serious damage by animals. As the living environment in rural areas further deteriorates, the number of the residents decrease. Such depopulated areas have difficulty in developing services, welfare and medical facilities. With a further decline in population, only the elderly persons who require social care are left in small numbers. Eventually, the villages cease to exist, and the biodiversity-rich environment of *satoyama*, which has been regularly managed and protected by people, also disappears.

These examples of the hypothesis chain show negative chains. What we need now is to turn them into positive ones.

For example, the Nyu district in the Kushida Watershed mentioned in the paper is a depopulated small settlement in a forest area. Still, the residents have made various efforts to revitalize the district. They have particularly continued efforts to plant hydrangea along water courses and footpaths within rice fields in cooperation with people from the town so that the barren countryside looks beautiful. The efforts developed environmental awareness in the district, and some local women opened a restaurant to serve healthy menus made of beans and other natural foods. The restaurant became popular, and attracted many people from outside of the district. The town has a cold mineral spring that is believed to have been found by Kobo Daishi, which is unused now, in addition to old streets. The residents have noticed the value of such resources and launched actions to use them for the revitalization of the town.

It is too early to judge the results of these actions. Still, focusing on their environmental resources, the district has started to make efforts to turn the negative chain into a positive chain.

As researchers, we have to follow such local actions and connect various areas of specialty to support the region and help it continuously solve its on-demand challenges, as well as to explore proposals that treat the local challenges as those for a more extensive area and reflect them in policies at higher levels. Academic disciplines at current universities are too specialized to handle this process. While it is also necessary to study each of the areas of specialty in depth, researchers especially have to cooperate beyond their areas of specialty and have a trans-disciplinary approach to solve specific and complex problems on a smaller scale and at the same time tackle difficult problems in the global environment. The basic and clinical study approach, which is the fundamental concept of our Global COE Program and also included in the title of this paper, is an important idea in the implementation of the above-mentioned process through cooperation between scholars and local communities to solve environmental problems, and we look forward to the development of this approach.

The above-mentioned examples of the chain are not related to landscape in a narrow sense. Rather, they may fall into the category of comprehensive spatial planning. Nevertheless, modern space-related problems such as global warming, declining

birth rate/aging population and energy problems stem from disharmony between human activities and the acts of the earth. In that sense, discussions in this paper significantly expand the scope of landscape planning. Although the researchers who study landscape planning in a strict sense may feel odd, we hope that before reading this paper, you understand that such a wider perspective will be important in the future.

9.3 Postface

The Germany–Japan symposium was held in English at the Lecture Hall in the Building of Environmental Studies, Nagoya University. In the sessions that ran from morning to evening, heated discussions were made about the future development of landscape planning in an international and cross-sectional manner. Taking this opportunity, we would like to thank again the lecturers, attendants and the interested persons of the co-sponsors.

Name Index

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