Chapter 15
Innovation for Social and Environmental Justice: A Way Forward?

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Abstract A prototype for self-managing social, economic and environmental decisions is discussed with the potential for managing household contributions to achieving the UN Sustainable Development Goals and scaling up the engagement through a management application at the local government level.

Keywords Sustainable development · Blockchain · Balancing individual and collective needs

A Way Forward?

The potential for blockchain programming to enable transdisciplinary distributive networks to codevelop and check the way in which users and providers meet sociocultural, economic and environmental indicators of wellbeing is currently being developed as a pilot through testing distributed hubs in Indonesia.

Test Out and Pilot on a New Form of Governance: From Centralized to Distributed Using Hybrid Methodologies to Address an Area of Concern

Options for governance are explored through considering nodes, networks and distributive webs (see Darien-Smith and McCarty (2017: 16) who cite Source: http://www.rand.org/pubs/research_memoranda/RM3420/RM3420-chapter1.html). Centralized options are appropriate for rapid responses, whilst decentralized options are suitable for engagement. An alternative is provided by decentralized networks which provide opportunities for cross-checking and engagement that can be rapidly

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achieved. Each node in the distributive network connects with other nodes to check on information available. A distributed network is characterized by cross-checking and relies on reciprocal sharing of information. An outcome of a distributed network is participatory governance based on transparency and the empowerment of local people who have instant access to verifiable data. The potential for misuse of resources is thus reduced. It could provide a way to protect food, energy and water security through protecting the commons. A completely new approach to economics is needed if we are to have a hope of addressing the consequences of the worst aspects of modernity.

A new approach to economics is needed if we are to have a hope of addressing the consequences of the worst aspects of modernity. The crisis in water delivery in Cape Town is the result of cascading factors which will be explained in this brief paper designed to join up the policy dots and to develop the case for transformative praxis based on the assumption that social and environmental justice rests on an understanding of our interconnectedness. If the UN 2030 Development Agenda is to be achieved, then widening gap between perceived needs and outcomes will need to be addressed through an alternative approach to representation, accountability and regeneration.

When food, water and energy costs rise, it poses a threat to human security and it is time to question the way in which economics currently values the essentials of a life worth living.[1]

The water usage map developed by the Municipality of Cape Town makes usage transparent to all and played a role in reducing usage. In this reflective note, we suggest that the water application could be applied to manage a range of resources towards achieving the Sustainable Development Goals. Social engagement to think about ecological citizenship could enable people to think through the social, economic and environmental consequences of their everyday decisions on production, consumption and distribution of resources. Collective responsibility can be distrib-

[1] This is a point made by Stiglitz et al. (2010) who stress the importance of supporting a raft of measures to support so-called wellbeing stocks for future generations. This theme was elaborated in *Transformation from Wall Street to Wellbeing* in which Janet makes the case for a new way to address cascade economics by valuing the fabric of life appropriately. Small pilot projects were undertaken to evaluate alternative ways of engaging the community to think about the social, economic and environmental indicators of wellbeing were tested by means of a prototype. The rationale for a more ethical form of representation and accountability to support cosmopolitan transdisciplinary approach is detailed in 'Systemic Ethics' (2014). Then in Planetary Passport (McIntyre-Mills 2017), Janet suggested ways in which the commons could be protected through working across conceptual and spatial boundaries to enable low-carbon, virtuous living in which resources are saved and regenerated to protect current and future generations of living systems. *Planetary Passport for Re-generation: Knowing Our Place Through Recognizing Our Hybridity* (McIntyre-Mills 2017) responds to the 2030 Development Agenda and suggests a way to enhance representation and accountability by extending the Millennium Goals and UN Sustainable Development Agenda. It reflects on studies of alternative architectures for democracy and governance and suggests a way to extend local engagement in social, economic and environmental decision-making. The book conceptualizes new architectures for democracy and better governance through:

- Addressing the issue of *a priori norms* and *a posteriori measures* for transformation towards regenerative living
- Finding ways to **match**s s*ocial, cultural, economic and environmental* decisions to *perceived needs* with a focus on food, energy and water security
- Narrowing the gap between perceived needs and the way resources are distributed and the way it impacts on service outcomes.

Table 15.1 Options for decision-making based on 'unfolding values' and 'sweeping in' social, economic and environmental considerations (Churchman 1971; Van Gigch 2003)[a]

• *I have* the following social, economic and environmental resources—each of which appear as a drop down menu to act as prompts to which people can add new categories or subcategories plus comments
• *I need* the following social, economic and environmental resources
• *I will add the following contributions*
• *I will discard* the following
• Self-reflection on *the turning points* for the better or worse—hope that consumption can be replaced with greater sense of attachment to others and the environment
• *Consideration of the barriers* that currently exist and consideration of what could be done to transform society and our relationship to the environment

[a]A score card has been piloted (see McIntyre-Mills and De Vries 2011; McIntyre-Mills et al. 2014). The aim is to make policy recommendations by exploring what works, and why and how through the local lived experiences of people who participate this is an attempt to address the issues (McIntyre-Mills et al. 2014, 2017a, b); see https://ia801606.us.archive.org/20/items/pathway_DEMO_1/pathway_DEMO_1.mp4

uted through this form of engagement from below so that local people can control decisions to enhance greater social and environmental justice for all (Table 15.1):

We suggest the potential for blockchain programming to enable transdisciplinary distributive networks to co-develop and check the way in which *users* and *providers* meet *socio-cultural, economic and environmental* indicators of wellbeing. This provides an alternative to the so-called *Surveillance* State where monitoring *from above* leads to big data sets being used to manage *from above*. The exposure of Cambridge Analytica (Cadwalladr and Graham-Harrison 2018) and the routine surveillance of citizens and targeted surveillance of the Uyghurs in China provide examples that indicate the extent of the risk globally in both old democracies and one-party states and the need for bottom-up participation in democracies. The way that economics currently operates places society at risk. Economists recognise that climate threat poses a threat to our way of life (Carney 2018), but the current structure of economics remains unchallenged. Stokols (2018 cites Goldstein et al. 2008) shows how caring behaviour can be contagious, because it shapes norms and expectations. The idea is to use engagement to self-monitor and advertise positive outcomes to others through a transparent online household management system. This could be scaled up at the local and regional level to enable the fair, transparent use and distribution of resources.

Blockchain[2] can be used to manage any resources from below defined in the pathways to wellbeing prototype software. Using the concept of 'haves and needs' and 'barriers and resources', pathways can be self-monitored, and progress can be reported. The self-monitoring is iterative, and at each stage, their progress towards supporting wellbeing is reported. Information is stored on a distributed network and relies on consensus across the network to support validity claims. The advantage of this decentralized approach is that items of data cannot be altered without alerting

[2] Blockchain 101 - Part 1 - A Visual Demo web address https://www.youtube.com/watch?v=_160oMzblY8&t=2s by Anders Anders Brownworth, Published on Nov 5, 2016. Accessed 12/06/2018.

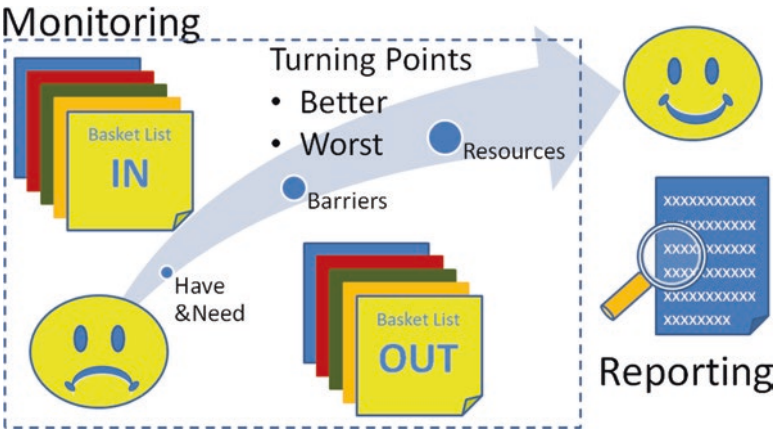

Fig. 15.1 Ecological citizenship means monitoring change from below to take rapid steps towards a more sustainable future based on the United Nations Sustainable Development Goals

the whole network. In this paper, blockchain technology is suggested as being suitable to present indicators of wellbeing and related information. The following diagram depicts the concept.

We need a human security system to identify social, economic and environmental risks through enabling people to participate in using a scorecard that maps social, economic and environmental accountability from below and above to balance individual and collective needs.

The potential for blockchain programming to enable transdisciplinary distributive networks to codevelop and check the way in which users and providers meet sociocultural, economic and environmental indicators of wellbeing is currently being developed by Wirawan as a pilot through distributed hubs, called village IT or Kampung IT in Indonesia.

Using blockchain, information is stored on a distributed network and relies on consensus across the network to support validity claims. The advantage of this decentralized approach is that items of data cannot be altered without alerting the whole network. In this chapter blockchain technology is suggested as being suitable to present indicators of wellbeing and related information, for example, monitoring and managing water, food and energy. The following diagram depicts the concept (Fig. 15.1):

An example of this is the path to saving water as suggested in this paper.

Participants can list their household needs and what they are prepared to do to save water. They can share that they have a family of five and that each person will need to save a certain amount from their water allocation for their gardens. The barriers they list may include a lack of subsidy for installing water tanks or solar panels which would help them to save money that they could use to make their households more resilient as detailed in *Transformation from Wall Street to Wellbeing* (McIntyre-Mills et al. 2014).

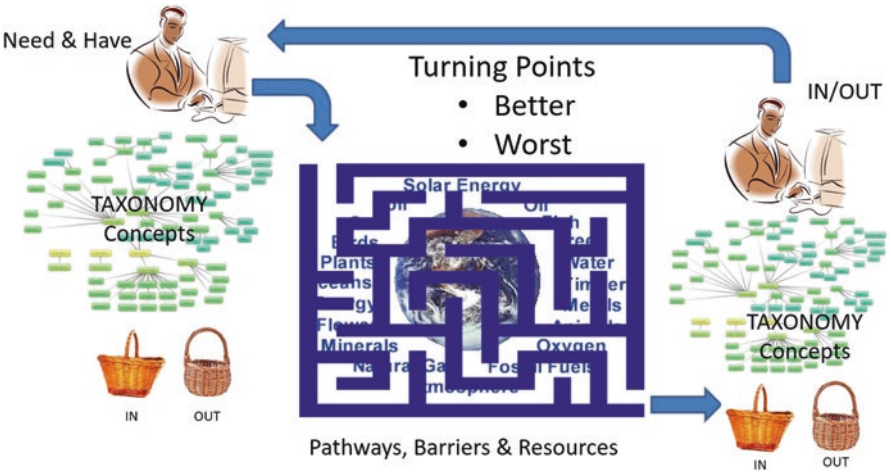

Fig. 15.2 Self-managing to address the barriers to achieving the United Nations Sustainable Development Goals

Using the concept of haves, needs, barriers and resources as depicted above, ecological citizens can self-monitor and manage their progress from one stage into the next in an iterative fashion (Fig. 15.2).

As can be seen from the diagram, the maze of options facing us in life poses many challenges for decision-making. Before re-entering the labyrinth to take decisions, the participant is asked to think through three scenarios, namely, 'business as usual' or 'making small changes' or taking more rapid 'steps towards supporting 'wellbeing stocks'.[3]

The following diagram describes three scenarios spanning 'business as usual', 'small changes for the long haul' as well as 'sustainable futures'. These scenarios cover the three potential options (Fig. 15.3).

Participants can add or discard ideas, skills or attributes that do not contribute to the success of the outcome. Their deliberations add to the growing database. The process will be repeated iteratively until the desire goal for each participant has been achieved. The software is designed to prompt participants to think in ways that are non-anthropocentric and thus to consider the implications of their decisions for others and the environment.

A generic application platform can be customized to a specific research type, such as mixed methods, by means of predesigned template, as depicted in the following diagram (Fig. 15.4):

Since the software is based on a platform designed in a generic manner, it can be used to enable participants to manage water and to address the size of one's carbon footprint.

[3] This scenario approach was inspired by the Mont Fleur scenarios (see https://www.youtube.com/watch?v=f92RYCZMwEk).

Fig. 15.3 Scenarios of options to guide 'if-then' thinking to balance individual and collective needs in terms of the consequences of their decisions for self, others and the environment on which they depend

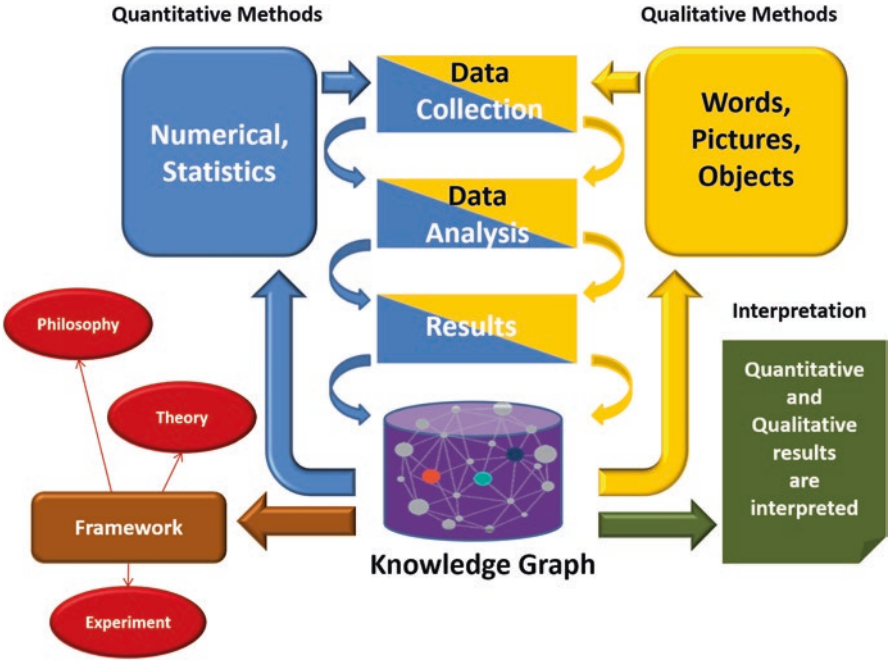

Fig. 15.4 Combining qualitative perceptions and quantitative data to manage from below and from above, in order to narrow the gap between service users and service providers

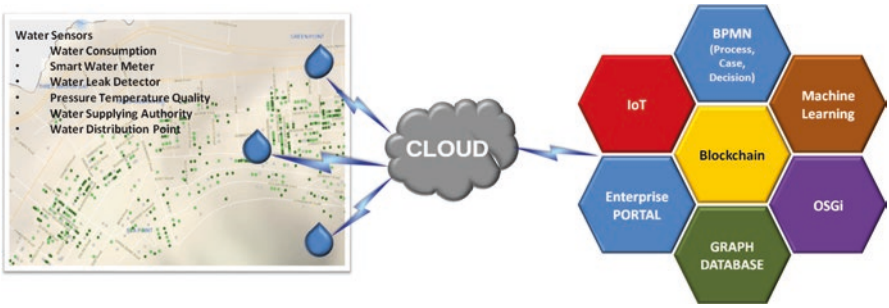

Fig. 15.5 Linking water management sensors to a water management system. Source: https://city-maps.capetown.gov.za/waterviewer/; http://www.capetownetc.com/news/green-light-for-cape-town-water-map-despite-objections

The following diagram shows the use of the generic smart platform integrated with IoT (Internet of Things) platform based on blockchain technology for managing the water crisis in South Africa (Fig. 15.5).

The above diagram, depicting different type of sensors, such as water consumption sensors, smart water metre sensors, water leak detector sensor, etc., are connected to IoT.

The following explanation of the technical details deliberately draws on Wikipedia explanations (see underlined text links) to enable readers to follow up on the explanations. A standard Business Process Model and Notation (BPMN[4]) can be used to provide businesses with the capability of understanding their internal business procedures in a graphical notation and will give organizations the ability to communicate these procedures in a standard manner. Furthermore, the graphical notation could facilitate the understanding of the performance collaborations and business transactions between the organizations. This could ensure that businesses will understand themselves and participants in their business and will enable organizations to adjust to new internal and B2B business circumstances quickly.

All data collected will be stored in a graph database which uses graph structures[5] for semantic queries with nodes, edges and properties to represent and store data. A key concept of the system is the graph (or edge or relationship), which directly relates data items in the store. The relationships allow data in the store to be linked together directly and in many cases retrieved with one operation.

The enterprise portal[6] is used for human interaction to the system. An enterprise portal, also known as an enterprise information portal (EIP), is a framework for integrating information, people and processes across organizational boundaries in a manner similar to the more general web portals. Enterprise portals provide a secure unified access point, often in the form of a web-based user interface, and are

[4] http://www.bpmn.org/

[5] https://en.wikipedia.org/wiki/Graph_(abstract_data_type)

[6] https://en.wikipedia.org/wiki/Graph_database

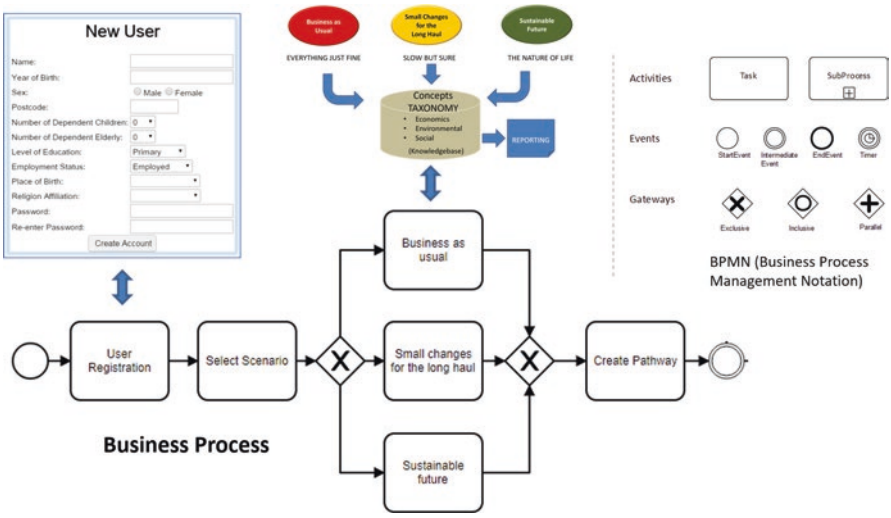

Fig. 15.6 Process management

designed to aggregate and personalize information through application-specific portlets (e.g. Smart Green Energy Portal).[7] All collected data can be turned into information, then to knowledge and ultimately to wisdom as described in DIKW Pyramid,[8] by utilizing the machine learning, which is used to analyse and extract knowledge from the graph database (Big Data Day).[9] To ease the integration of different frameworks and technologies used in P2W application, we can utilize the OSGi Alliance, formerly known as Open Services Gateway Initiative technology. The OSGi technology[10] is a set of specifications that define a dynamic component system for Java. These specifications enable a development model where an application is composed of several components which are packaged in bundles. Components communicate locally and across the network through services. Components are the reusable building blocks, i.e. the bricks; the components provide the implementation code.

Using business process management notation (BPMN), the process is depicted in the following diagram (Fig. 15.6):

The following diagram depicts the mapping between the pathways iterative application with the process model implementation using BPM notation (BPMN) (Fig. 15.7).

[7] http://wirasoftfoundation.org/en_GB/web/smartenergy/home

[8] https://en.wikipedia.org/wiki/DIKW_pyramid

[9] https://www.youtube.com/watch?v=2FtjAS0HL8A

[10] https://www.osgi.org/developer/architecture/

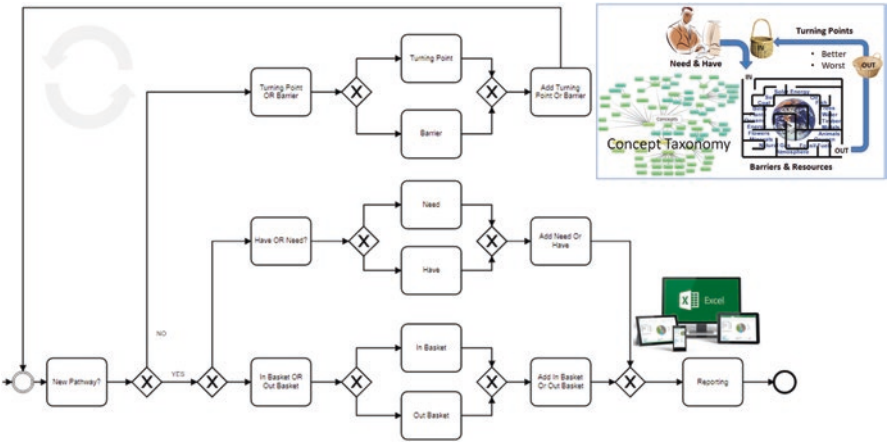

Fig. 15.7 The mapping between the P2W iterative application and the process model implementation using BPM notation (BPMN)

The weblink[11] gives details of the proposed design. It is an abridged set of slides to the Venture Institute, Flinders University, and details the way in which the software could be extended to address the challenge, namely, energy, mobility and communication, applied to address food and water security. The mapping system could aid a comprehensive intersectional understanding and address the concern that people currently feel 'let down' by current policies and they need to ensure that the risks are addressed in a transparent way which ensures that consumption of scarce resources is addressed in ways that are representative and accountable. This applies to food, energy and water management. Existential risks (Bostrom) are likely to increase unless the Intergovernmental Panel on Climate Change (IPCC)[12] formula is addressed in ways that engage ecological citizens.

[11] http://wirasoftfoundation.org/web/smartenergy

[12] The Intergovernmental Panel on Climate Change (IPCC) formula, namely, *E* (Emissions) = Pop ulation × Consumption per person × Energy Efficiency × Energy Emissions, suggests that the privileged urban lives of some could lead to 'existential risk' for people and the planet (Bostrom 2011) which is why it is necessary to enhance our understanding of consumption. Nussbaum discusses the essential capabilities that are needed by sentient beings to live a life worth living. She takes the initiative to design and construct the essential conditions. She is not suggesting that people should be limited, she is making a case for *extending rights beyond the human* in 'Frontiers of Justice' in which she discusses the current limitations of *social contract theory* to **protect** those who *fall outside the boundaries of the nation state* or outside the parameters of state protection as they are non-citizens. These include asylum seekers, those who have lost citizenship (because they are labelled criminal) and the disabled, She then extends protection to *all sentient beings* and the need to p*rotect the environment* on which we all depend. In this way she also introduces protection of habitat for all living systems, although she does not specifically spell out our hybrid inter dependency. Andrea Nightingale has developed an intersectional study on access to land in Nepal that is shaped by caste and gender. Thus intersectional analyses need to take categories as just one dimension of more comprehensive analyses to support social and environmental justice.

This approach to ecological governance identifies social, economic and environmental risks through enabling people to participate in using a regenerative living and resilience scorecard. By addressing so-called wellbeing stocks (Stiglitz et al. 2010: 15)[13], a multidimensional measure spanning social, economic and environmental makes steps towards protecting the commons. Some aspects of life are beyond price[14] and need to be regarded as part of the fabric of life.

Boulding stressed that transformation requires the highest level of response as the level of complexity required for transforming society increases as we move from inorganic to organic, to animal and to human life.

The neo-liberal agenda has pushed developing countries , such as South Africa facing both water and energy insecurity to the brink (see, for example, Bond and Mottiar 2013). The Nevertheless the agency shown by Civil Society movements, responses (albeit belatedly by the state, despite the political stand offs) set an agenda that needs to be met by innovative economic transformations that are not in line with the same old paradigm that has been emulated by the BRICS network (Bond and Garcia 2015; Bradlow 2017). In these references, it is stressed that BRICS has done little to address sustainability and has instead repeated the same old messages.

This requires simple systems that support representation for enhanced equity, accountability to enhance fairness and transparency and regeneration for the restoration of the commons and the assumptions and values that support it.

Reframing Knowledge Through Researching Relationships to Protect the Web of Life

As stressed in 'Democracy and Governance for Resourcing the Commons: theory and practice on rural-urban balance (McIntyre-Mills 2017: 88–89), the purpose of our policy research to date has been to explor and deepen an understanding of the complex, interrelated factors underpinning decision-making and resource sharing, in order to respond to the UN Sustainable Development Goals. The most impactive

[13] '1 Material living standards (income, consumption and wealth), 2. Health, 3. Education, 4. Personal activities including work, 5. Political voice and governance, 6. Social connections and relationships, 7. Environment (present and future conditions), 8. Insecurity, of an economy as well as a physical nature'.

[14] All life is interdependent and vulnerable, but as human beings, we need to act as stewards as we are responsible for achieving Boulding's notion of transformative culture (Boulding 1956). The authors draw on Butler and Athanasiou (2013) to stress the need for performative agency to protect the commons and the need to concentrate on dynamic ways of working with others. McIntyre-Mills, (2017) expands the concept of 'wellbeing stocks' developed by Stiglitz et al. (2010) to take on board the points made by Nussbaum (2011) about the need to appreciate the 'determinants of a life worth living'. The capabilities approach needs to draw on both Amartya Sen's functionality and Nussbaum's a priori idealism. In reworking the capabilities approach, McIntyre-Mills (2014 in Systemic Ethics, 2017 in Planetary Passport) make a case for both *rights and stewardship* to protect living systems and sentient beings, simply because it is the right thing to do.

element of a transformative system needs to develop water and energy in combination with food and shelter. Water security exists in parallel with energy harvested and those in combination of food and shelter that enables regeneration of resources to benefit the service users.

Ecosystemic approaches to regenerative service delivery need to *work with nature* by using *natural energy sources* and designing *rural-urban linkages that support food and water security* which are core to supporting *the wellbeing and resilience of living systems*.

In his preface, Adam Smith (1776a, b: 4) discusses the imbalance in development:

> Some nations has given extraordinary encouragement to the industry of the country; that of others to the industry of towns. Scarce any nation has dealt equally and impartially with every sort of industry.

Adam Smith (1776a, b: 24):

> It is not from the benevolence of the butcher the brewer, or the baker that we expect our dinner, but from their regard to their own interest. We address ourselves, not to their humanity, but to their self-love, and never talk to them of our own necessities, but of their advantages. Nobody but a beggar chooses to depend chiefly upon the benevolence of his fellow-citizens.

Enlightened self-interest in today's context would require rethinking the example and rethinking what cascade economics to protect living systems could look like. I find it hard to accept that the time and motion principles (embedded in the wealth of nations) that provide the basis for factory organization and the commodification of labour and extraction of rent were discussed by Smith without actually questioning the way in which the economic system operates. Smith seemed to think that *if capitalism is applied in an ideal and organized way*, then the profits would flow on to all.

Economic growth does not entail a fair distribution of resources to protect all living systems. The wicked nature of climate change, displacement of people, loss, unemployment and poverty is explored as it affects multiple species.

The cascading effects of climate change can be better understood and hopefully redressed through intersectional pathways to mitigate the causes and adapt to the effects of climate change. These pathways include:

- Identifying issues and working with the community
- Identifying what the problem is represented to be by different stakeholders (Bacchi 2009)
- Identifying what and who is currently included and excluded and why in policy planning processes
- Identifying what, who and why ought to be included in a better design to address wicked challenges that have many interrelated problems that are perceived differently from different stakeholders
- Identifying ways to prevent loss of land
- Identifying species that are under threat as a result of habitat loss

- Matching resources to their needs
- Identifying pathways that address complex needs through working with a host of factors simultaneously and in a non-linear manner as detailed in McIntyre-Mills and De Vries (2010), McIntyre-Mills et al 2014) and McIntyre-Mills et al. (2017)
- Lobbying to address policy changes

The notion of virtuous living needs to be explored in terms of:

- **A priori norms** that are guided by accepted rules of behaviour that protect sentient beings and the fabric of life on which they depend
- **A posteriori indicators** that measure the extent to which service users act as stewards for current and future generations

Both norms and indicators are needed, in order to guide practices and to hold people and their elected government representatives to account and to engage people to resource the commons. In this paper a case is made for a way forward to address the cascading effects of climate change in the Western Cape region of South Africa by redressing the rural-urban imbalance in development opportunities. The actions taken by the Municipality of Cape Town succeeded in managing the scarce resource and balancing individual and collective needs.

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