Systemic Regional Development – A Systems Thinking Approach

1 Introduction

Regions are places for people’s homes, work and recreation and the main providers of ecosystems services. They are undergoing rapid changes brought about by multiple natural and human-mediated driving forces. The changes are taking place at various spatial and temporal scales and across scales. Ever-increasing urbanisation is visible everywhere, employment and family structure are changing, and the organisations that traditionally have been responsible for managing the regions are being transformed.

Regional changes impact on biodiversity and natural resources, such as vegetation, soils, water and atmosphere; they are thus related to many environmental issues of global importance (Steffen et al. 2004; MA 2005). Climate change is a newly perceived environmental stressor with potential major consequences for the survival of humanity and the Earth’s ecosystems (IPCC 2007; Wilson/Piper 2010).

Attempts by governments of different persuasions to confront these challenges have only partially succeeded or failed altogether (Capistrano et al. 2005; Lazio 2006). Analyses of the failures show that conventional regional development approaches are generally based on partial or flawed theories and assumptions. In particular, politico-administrative decisions on important social issues are almost invariably taken from a sectoral, and thus partial, viewpoint. This has led to the formulation and implementation of partial solutions and compartmentalisation (Beer/Maude/Pritchard 2003; Kuiper/Kuijpers-Linde/Bouwman 2011).

Furthermore, traditional approaches have not kept pace with the speed of changes that alter and control development processes in large-scale, coupled natural-human, or social-ecological, systems (Lee 1993; Gunderson/Pritchard 2002; Liu et al. 2007). Poor understanding of their systemic behaviour has diminished our ability to formulate effective policy responses (SOEAC 1996; Gunderson/Holling 2002).

A consensus on the nature of the problematic situation is however emerging. Regions are extremely complex and dynamic systems in themselves and many of the regional issues involve the additional complexity of synergistic interactions between them (Norgaard 1994; Levin 1999; Holling 2001; Berkes et al. 2003). This complexity creates an insurmountable barrier for traditional disciplinary approaches. Phenomena whose causes are multiple, spatially spread and involve human activities cannot be understood, let alone planned, through research organised along narrow disciplinary lines (Churchman 1968, 1971; Holling/Meffe 1996; Meadows/Meadows/Randers 2004).

A novel methodological approach is therefore required to analyse, plan and manage the sustainable use of resources and ecosystems in regional systems in the 21st Century – this approach, which is based on Systems Thinking, is called in this article systemic regional development.

A number of important concepts require discussion for a better understanding of the methodological approach. Thus, after a brief introduction into Systems Thinking in the next section, section 3 examines several fundamental systems concepts whilst section 4 outlines three key and complementary systemic intervention activities. Based on this knowledge, the systemic regional development methodology is explained in section 5. The article concludes with some reflections on the importance of long-term planning and action.

2 Systems Thinking

Systems Thinking, or Systemic Science, is commonly used as an umbrella term to refer to approaches that complement and sometimes replace scientific and other methodologies based on reductionist thinking. Over the past decades, different systems paradigms have emerged embracing significantly different stories about what constitutes Systems Thinking and how it has developed. There are some common
points of reference in the early discourses (see the next paragraph) but then different approaches proceed in different directions (Midgley, 2003, Introduction: xix). It is nevertheless generally agreed that Systems Thinking encompasses approaches to conceptualise problems and deal with complexity, uncertainty and risk. Systems thinkers make a conscious use of the concept of wholeness captured in the word ‘systems’ to guide their thoughts (Checkland 1981: 3 ff.). By looking at the behaviours and interactions of the elements that make up the whole problem or system, it is often possible to arrive at different conclusions or solutions than those achieved using solely the traditional scientific paradigm.

Although there is controversy regarding the origins of contemporary Systems Thinking, it is however clear that in the mid-1940s three parallel and mutually supportive fields of inquiry came to prominence:

- **General Systems Theory (GST)** – key writers on GST included von Bertalanffy (1956), Boulding (1956) and Bunge (1977);
- **Cybernetics** – the main theorists in the early days of Cybernetics were Wiener (1948), Ashby (1956), Beer (1966, 1981) and Bateson (1972); and
- **Complexity Science** – key writers in its initial development were Weaver (1948), Prigogine (1947/1961) and Simon (1962); the last two authors won Nobel Prizes for their work.

Systems ideas, concepts and a special vocabulary have now extended to almost all disciplines. Midgley (2000, 2007), using the word ‘wave’ as a metaphor, argues that there have been three waves of Systems Thinking, each of which offers a different basic understanding of systems and consequently a different methodological approach.

System Thinking has thus spawned several hard and soft systems methodologies. Hard systems methodologies are primarily goal-orientated in tackling structured problems, mainly in the physical field, where defined objectives and constraints exist and the significant variables are generally quantifiable. These systematic methodologies typically involve simulation using the techniques of Operational Research (OR), gaming and systems engineering (Hall 1962). Hard systems methodologies include: Systems Dynamics (Forrester 1961), Systems Approach (Chadwick 1971; Ackoff 1974), and Systems Analysis which is associated especially with the RAND Corporation (Quade/Boucher 1968).

Soft systems methodologies are generally used in the absence of a concrete definition of ill-structured problems in which purposes and objectives are themselves problematic. They are commonly used to tackle systems that cannot be easily quantified, especially those involving social aspects and people holding multiple and often conflicting views, values and frames of reference (called ‘worldviews’). Soft systems approaches utilise foundation methodological work developed by Peter Checkland (1981) and his colleagues at Lancaster University, UK (Checkland/Scholes 1990).

### 3 Fundamental Systems Concepts

*This section starts with some notes on methodology and the need to be flexible in combining methods in Systems Thinking. Planned or purposeful action in systems is significantly different than traditional policy making; therefore, fundamental principles of systemic intervention are explained. The notion of sustainable development as a multi-dimensional process is then discussed and, based on this notion, the concept of a regional system is explained.*

**Multimethodology – Mixing and Matching Methods**

Coupled human-natural, or social-ecological, systems are such that nothing ever happens twice, not in exactly the same way (Liu et al. 2007). This means that the approach to deal with the complexity of real-world situations has to be a methodology. As the word indicates, a methodology is a logos of methods; i.e. it is a structured set of principles which can be adapted for use in a way that suits the specific nature of each situation in which it will be used (Checkland 1981; Mingers 1997). As methodology is essentially theoretical, we can accept a plurality of theories flowing into methodology and, hence, a variety of methods may be seen as legitimate. The value of being aware of, and learning from, diverse methodological perspectives – and their strengths and
weaknesses – comes from the knowledge that not one theory can ever be holistic (Midgley 2000: 171).

Therefore, employing more than one method in combination helps to address the various dimensions of a complex problematic situation. At its simplest, multi-methodology just means employing more than one method or methodology. It refers to the possibility of combining together different methods, or part thereof, within a particular systemic intervention. In practice, therefore, we can draw upon methods originally developed within other methodologies and reinterpret them through our own methodology. For instance, if we are using a systems methodology, even methods created outside systems paradigms can be deployed as part of systemic intervention (Midgley 2000: 215). The great merit of allowing methods to be detached from their associated methodologies, and be employed flexibly, is that it allows practitioners the maximum freedom to respond to the particulars of the problem situation as well as to the twists and turns taken by the planned intervention (Jackson 2003: 302 ff.).

Systemic Intervention

Systemic intervention is defined by Midgley (2000: 113 ff.) as planned action by an agent to create change in relation to reflection on system boundaries. An agent is either an individual or a group of people in communication and interaction that have purposes ascribed to them (e.g. a project team or an organisation). Three complementary activities embody the core concern of Midgley’s systemic intervention.

(i) Boundary Critique/Boundary Judgment: Since any attempt to comprehensively study a system or a problematic situation is unrealistic (Bunge 1977), reflection on its boundaries enables the analyst to investigate options for inclusion or exclusion. The theory of boundary critique draws together the ideas of Churchman (1968, 1971), Ulrich (1983, 1987) and Midgley (2000). Setting out the boundaries defines both the knowledge to be considered as relevant as well as the people who generate the knowledge and also have a stake on any attempt to improve the system of interest. Boundary judgments and value judgements are intimately linked; i.e. the values adopted in the systemic intervention will guide the drawing of boundaries that define the knowledge accepted as pertinent. Similarly, the process of drawing boundaries constrains the ethical stance taken and the values pursued.

(ii) Choices on Theories and Methods/Multimethodology: The second activity is the need for agents to make choices between theories and methods to guide action. If understandings can be bounded in many different ways, then, each of the boundaries may suggest the use of a different theory and, conversely, each theory implies particular boundary judgments. This entails the use of a multimethodological approach as discussed above.

(iii) Action(s) for Sustainable Improvement: Lastly, the systemic intervention methodology has to be explicit about taking action(s) for improvement (Checkland 1981; Checkland/Scholes 1990). This requires consideration of the two key words: ‘action’ and ‘improvement’. As argued by Midgley (2000: 130 f.), it is not possible to formulate a general definition of action since its meaning has to be determined in local contexts. This does not necessarily imply a geographic locality because the context may be broad in scope; for example, when dealing with international relations, or global environmental problems such as climate change. Indeed, the use of different systems boundaries, theories and methods will give rise to different understandings of what it means for an agent to take action. Similarly, the term ‘improvement’ has to be defined locally as different agents may use different boundary judgments and, hence, what looks like an improvement to one agent may look like the opposite to another agent (Churchman 1968, 1970). Moreover, what constitutes an improvement today may not be considered as such by future generations. We can then say that an improvement has been realised when: (i) a desired consequence has been achieved through intervention, and (ii) the improvement looks like it will last into the indefinite future without unintended negative consequences. The notion of sustainable improvement
is important because agents are restricted in the number of interventions they can undertake and, consequently, they must prioritise about the possible interventions that are available.

**Sustainable Development**

The modern conception of sustainable development grew up from the debates of the 1960s and 1970s when eminent scientists drew attention to the impact of chemicals on humans and the environment (e.g. Carson 1962). The notion had also its roots in the idea of a sustainable society (Brown 1981) and the sustainable use of renewable and non-renewable resources (IUCN 1980).

The World Commission on Environment and Development (WCED) adopted the concept and launched it into political and academic discourses. The WCED’s (1987: 8) definition of sustainable development as the “ability to make development sustainable – to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs” is regarded as the standard definition when judged by its widespread use.

The 2002 World Summit on Sustainable Development marked a further expansion of this definition with reference to three pillars. The Johannesburg Declaration on Sustainable Development (4/9/2002) set up “a collective responsibility to advance and strengthen the interdependent and mutually reinforcing pillars of sustainable development – economic development, social development and environmental protection – at local, regional, national and global levels” (Kates et al. 2005: 12). This addressed a running concern over the limits of viewing sustainable development solely as economic growth.

The only basis for sensible long-term decision making is therefore the approach that, at a broad level of aggregation, gives explicit recognition to four sub-processes of development taking place within a set of corresponding fields (or domains) or spaces (see figure 1). The sub-processes are conceived of as tied together in a system of interdependencies and they affect several spatial and temporal scales. Accordingly, sustainable development must be analysed concurrently in ecological (or biophysical), socio-cultural, economic, and organisational (including politico-administrative) fields or spaces. The development process manifests itself in its spatial (i.e. geographic) dimension.

The organisational field is, by its nature, different to the others. The belief that sustainable organisations and institutions are crucial for the realisation of sustainable development is supported by initial evidence from developing countries and, more recently, by studies in developed countries (Dimitriou/Thompson 2001; OECD 2002). The countries analysed in the OECD publication are Canada, Germany, Japan, the Netherlands and the United Kingdom.

Driving forces, or drivers of change (Nelson et al. 2005), operate in each of the fields, and each field has specific strategic objectives whether they be protecting the integrity and resilience of ecosystems (ecological field), improving human welfare through increases in the production and consumption of goods and services (economic field), enriching human development and relationships (socio-cultural field) or developing sustainable organisations/institutions (organisational field).

Changes in one of the fields can have effects or impacts on the others and provoke changes in them. Transformations in the

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(5) The basis of this approach are the concepts mentioned above and the consideration of topological spaces as put forward by the French economist Francois Perroux 1964a, 1964b and extended by the Spanish economist Jose Lasuen 1972, 1973.
various fields can thus be produced either directly, by changes that are taking place or by making changes in a given field itself, or, also indirectly, by changes occurring in some of the other fields and causing repercussions in the first one (Lasuen 1973).

Regional Systems

From Systems Thinking, we know that systems are embedded in systems and what is considered as an element in one level of analysis may itself constitute a system at a lower or higher level (of abstraction). Therefore, a country or a state can be considered as a system of interacting (sub-)systems; each (sub-)system being a region which is more or less integrated into the larger system. In other words: (i) the components of the country, or the state, can be looked at in such a way that they form clusters of (sub-) systems which interact through a number of relationships; and (ii) each of these clusters refers to a region. The national/state system of regions is, in turn, a (sub-)system of the global system (i.e. the supra-system) and is thus subject to driving forces in the international setting as well as those that actuate within (Hilhorst 1971).

Consistent with the interpretation of sustainable development and system concepts, a regional system can then be thought of as composed of four (sub-)systems existing within a set of corresponding (topological) spaces: ecological (or biophysical), socio-cultural, economic, and organisational (including politico-administrative) (see figure 2). The regional planning process, although focused on a territory (i.e. geographic space), must then consider the relevant aspects of the system of interest in the four spaces.

The very concept of a regional system makes it clear that any of its (sub-)systems and its corresponding space is a selective simplification, implying boundary critique about the inclusion of some elements and the exclusion of others. When the purpose is a cognitive one, the system of interest will include those elements necessary to explain or describe the phenomena that interest us. When the purpose is normative, the system must be described with a view to the effectiveness of policy and action upon it. The definition of a 'region' will thus vary with the characteristics of its components and interrelations being considered as well as with the purpose of the systemic intervention and/or analysis. For instance, a regional system defined for catchment management will be different from one defined for the measurement of the economic multiplier effects of an investment. Implicit in this discussion has been the level of abstraction. That is to say, the concepts of socio-cultural, economic or organisational spaces are at a higher level of generality than the concept of geographic space.

4 Systemic Intervention through the Essential Variables of a System

Systemic intervention requires acting upon a small set of system variables to attempt guiding or managing the system of concern; these variables are termed in what follows 'essential variables'.

Control in Complex Systems

Any regional system is exceedingly complex. The notions of great complexity, interaction between systems which are in themselves very complex, and of decision, control and purposive behaviour in systems are the do-
main (though not exclusively) of Cybernetics. Cybernetics was initially considered as the scientific study and mathematical modelling of regulation and control in any system. Today, cybernetics has a broad range of applications including large-scale socioeconomic and environmental systems, and organisational management (Mingers/White 2010). A new understanding of complex systems is emerging to supplement cybernetics ideas and concepts with advancements in the ecological field. This section therefore first introduces key cybernetics concepts which are then supplemented by ecological concepts.

According to cybernetics, there are general laws which govern control processes and, hence, to guide a system is to control the changes that the system is undergoing so as it follows an intended trajectory (Ashby 1956: 25). Control is a deeply entrenched feature of contemporary societies. We control traffic flows through several devices including regulations and traffic signals; we control the effects of climatic variations by constructing suitable dwellings and through heating and cooling devices. This ‘command-and-control’ approach assumes that the problem is well-bounded, clearly defined, relatively simple and generally linear with respect to cause and effect. When this approach is uncritically extended to complex and poorly understood systems (e.g. ecosystems), it often results in unforeseen and undesirable consequences (Holling/Meffe 1996).

However, as argued by Beer (1966: 255), “control is not a mandatory exercise in which people are bullied or things are coerced to operate in a desire way. Rather is it a question of coaxing a system towards optimal performance; or, even better, of arranging for the system to regulate itself.” (Beer 2004: 857).

“Biological] homeostasis is that feature of an organism which holds some critical variables steady within physiological limits” (Beer 1966: 289). The homeostasis of blood temperature is a most quoted example: within the human body there are several (positive and negative) feedback loops that operate to keep the body temperature very close to 36.9°C although the body passes from refrigerator to furnace-room.

The Role of Essential System Variables

Drawing from the biological sciences, Ashby asserted that certain system variables are logically necessarily for guiding complex systems. Each system has a set of states (M) in which the system is viable – whilst viability is defined in cybernetics as the ability of a system to persist under conditions of internal and external changes. “The states M are often defined in terms of variables. The states M1 . . . Mk that correspond to the living organism are then those states in which certain essential variables are kept within assigned limits” (Ashby 1956: 197, bold text in the original).

Based also on biological concepts, the ecologists Gunderson et al. (2002a) argued that the future state (evolution) of a regional system is determined by the relationships between the capacity for change in the social system and the resilience of its ecological system. Extending the concept of viability, resilience is defined as the capacity of a coupled social-ecological system to absorb disturbances (i.e. a spectrum of shocks or perturbations) and to sustain and develop its fundamental function, structure, identity and feedbacks through either recovery or reorganisation in another context (Chapin III et al. 2009: 24f.). Moreover, Gunderson et al. advanced the notion that it is crucial to identify a few controlling variables that characterise the system dynamics: “The organization of regional resource systems emerges from the interaction of a few controlling variables. The essential structure and dynamics of complex systems are produced by the interaction of at least three, but no more than six, variables that operate at spatial and temporal scales that differ by approximately an order of magnitude” (Gunderson et al. 2002a: 17, italics in the original)."
Systemic Guidance of Regional Systems

Consequently, this very important systems concept has been ignored or misinterpreted in planning and decision making: only the essential variables of the regional system of interest should be attempted to be systematically managed to ensure that they remain within the limits defined by sustainability. It is, however, necessary to understand the dynamics of the system as a whole (though not necessarily in complete detail throughout) to guide it effectively.

Furthermore, as pointed out by both Ashby (1956) and Beer (1966, 1981), the essential variables must be maintained within certain value ranges. In a simple, mechanistic system its essential variables are within their assigned bounds as determined from outside the system, usually by a human controller (e.g. when a navigator calculates the course for an aeroplane and then sets the automatic pilot to follow the course).

Extremely complex systems, such as regional systems, have typically internalised these processes; i.e. the controls are intrinsic to the system. As discussed, a regional system can be thought of as comprising four subsystems, one of which, the organisational system, is where the policy instruments are formulated. The management process in complex systems is therefore fundamentally different from that in mechanistic systems.

Characterisation of a Regional System (through its Essential Variables)

As argued by Gunderson et al. (2002b) and Chapin III et al. (2009), a complex system may have multiple stable states and alternative stable organisations. This means that the system, in its evolution, can move to various possible stable states and, hence, future options along the system trajectory should be left relatively open. To explain this, Gunderson et al. refer to fisheries where some managers are exploring the use of ‘reference directions’ (e.g. increasing the number of sexually mature year-classes in the fish population instead of the conventional target reference points, for example, a catch of 1000 tonnes of a particular species). This kind of approach shifts the concern of management actions from the exacting question ‘where do we want to be’ to the more manageable question of ‘how do we move from here in the desired direction’ (Berkes et al. 2003). Therefore, planners and managers attempting systemic intervention in a regional system must constantly review and re-define the desirable value ranges of the essential variables as well as closely monitor the system trajectory and the changes in the system environment.11

More importantly, it is possible that the system in its trajectory may have irreversibly changed and, hence, the only possible strategy is to adapt to the new, transformed state of the system. This implies that some or all of the essential variables may have changed and a new set may need to be defined. This is a further indication of the need for a continuous, iterative approach, based on feedback learning, as exists in systemic intervention.

Depending on the agent’s intention in pursuing a particular systemic intervention and the context of the system of interest, different resolution levels of the system of interest can be selected as relevant. Consequently, the selection of the essential variables of a system is a result of the agent’s perception, or understanding, of the system-in-focus and the situation in which it is embedded. In other words, it is a consequence of the (cybernetic) perspective from which the system is viewed by the agent. Therefore, the selection of the essential variables of a system is meaningful only in relation to the system defined through boundary critique at a particular resolution level or level of abstraction. It is always possible to increase or reduce the level of resolution of a system and, consequently, alter the information and analyses required to respond better to changing circumstances.

It also follows that the system variables selected for the dynamic characterisation of the system of interest should not differ from the variables upon which systemic guidance will be attempted; i.e. the essential variables of the system. A practical example of this approach is the analysis of the resilience and adaptive capacity of the Western Australian Agricultural Region (Allison/Hobbs 2004). Consistent with Holling’s ‘Rule of Hand’ – the number of variables should be less than the number of fingers on one hand – only five variables were selected. The variables in the ecological, social and economic (sub-)systems were: (1) the area of productive land, (2) the number of agricultural establishments, (3) farmer

10 These are called ‘control devices’ in cybernetics.

11 For example, through monitoring changes in the driving forces of the system.
age, (4) agricultural terms of trade, and (5) the wheat yield (economic production target). Based on them, they also developed a conceptual model of the dynamics of land use change patterns – a predominant progression in the Western Australian Agricultural Region from primary native vegetation to a productive broad acre agricultural system.

5 Systemic Regional Development Methodology

Based on the concepts described in the two previous sections and using a holistic model of decision making in the public realm developed by Sposito (2008), the Systemic Regional Development Methodology is discussed as well as illustrated in figure 3.

The three key activities of systemic intervention – boundary critique, choices on theories and methods, and action(s) for sustainable improvement – are depicted at the centre of the diagram informing the various phases of the process. The process is cyclical and feed-back loops link all the phases; however, to avoid further complicating the diagram the feed-back loops have been omitted in the figure. Each phase of the process is succinctly described below and some methods that can be deployed, mainly from the soft systems field, are briefly mentioned.

Phase 1 – Problem Structuring/Purpose of the Project and Systemic Intervention:
The most demanding and troubling task in formative decision situations is to decide what the problem is. There are too many factors, many of the relationships are unclear or in dispute, and different stakeholders have diverse worldviews and priorities (Rosenhead/Mingers 2001). This phase thus includes an initial appraisal of the complexity of the problematic situation facing the regional system of interest as well as the design of a project plan to guide the systemic process. Since most regional problems are ‘wicked’ (Rittel 1972) or ‘messy’ (Ackoff 1974), the term *problematique* is also a good

Figure 3
Systemic Regional Development Methodology

Source: own illustration
description of this initial phase (Warfield/Perino Jr. 1999). In this phase (i) the existing, relevant information on the system and its environment – e.g. from previous studies and experts’ opinions – is reviewed and synthesised; (ii) the agents in the process, including systems analysts and decision makers, are identified; and (iii) the goals and objectives of the project and systemic intervention are formulated.

Methods that can be employed in this phase are called Problem Structuring Methods (PSM). PSM use models to assist (mostly) group decision making, since it is rare for wicked problems to be tackled by single decision makers (Rosenhead/Mingers 2001). PSM that can be used, either singly or in combination, include: (i) Cognitive Mapping and Strategic Options Development and Analysis (SODA) (Eden/Ackerman 1998); (ii) Boundary Analysis (Ulrich 1987); (iii) Rich Picture Building (Checkland 1981; Checkland/Scholes 1990); and (iv) Conversation Mapping (Bawden et al. 2012).

Phase 2 – Region of Interest and Context:
Guided by boundary critique, significant outcomes of this phase are an initial definition of the regional system of interest or system-in-focus (according to Beer 1981, 1985) and its context.

Phase 3 – System Description and Analysis/Four Regional Sub-Systems: As discussed, a regional system can be thought of as composed of four main sub-systems: ecological (or biophysical), socio-cultural, economic, and organisational (including politico-administrative). Therefore, each of the sub-systems must be described as well as its driving forces. This means that the agent must select the theories and methods to perform the analysis in each of the sub-systems.

Phase 4 – Essential System Variables/Four Regional Sub-Systems: The selection of the essential variables of the regional system of interest, respectively in each of its four sub-systems, is steered by the purpose of the systemic intervention being pursued. As discussed, transformations in the various spaces can be caused either directly, by changes that are taking place or by making changes in a given space itself, or, indirectly, by changes occurring in the other spaces and causing effects on the former space. This means that a goal in one sub-system (space) may be realised by actions taken in the other sub-systems/spaces.

Phase 5 – Solution(s)/Action(s) for Sustainable Improvement: This includes the generation of options for the sustainable development of the regional system-in-focus and their holistic appraisal. An important consideration is to ensure that sustainable improvements will occur in the regional system once the selected actions are implemented. According to Checkland’s Soft Systems Methodology (SSM) (1981: 180 ff.), the debate with ‘concerned actors’ about actions to be carried out, aims at defining changes which must meet two criteria. They must be both systemically desirable (on the basis of the models formulated in the previous phases), and culturally feasible given the unique characteristics of the situation, the people in it and their world-views. The SSM works here with the idea of finding an ‘accommodation’ among the group of people with a common concern. If the people are to achieve agreed collective action in response to a problem situation, they will need to find an accommodation. That is, they will need to find a version of the situation which they can all live with (Checkland 1981: 180 ff; Checkland/Poulter 2006: 55).

Phase 6 – Decision Taking: Phases 1 – 5 are the province of what traditionally has been called decision making, whereas those included in Phase 7 can take place only after the decision to implement a particular course of action has been taken. Decision taking is therefore located at the articulation point between decision making and implementation. It is important to consider it as a separate phase to distinguish, at least conceptually, the role of decision makers, including policy analysts and scientists, from the role of politicians. That is, to distinguish between those who provide the knowledge upon which decisions are based and those who take the decisions and give the commitment, including funding, required for their implementation. In this phase, the various policy instruments are also prioritised by reference to the local context which, as we have discussed in section 3, does not necessarily imply a geographical locality.

Phase 7 – Implementation, Monitoring and Review: This continuing phase involves: (i) implementing actions and evalu-
ating their results; (ii) monitoring as well as reviewing the essential variables selected to ensure that they are still relevant; and (iii) sustaining the initiatives initiated by the project(s). A cycle of learning and action is thus complete, and the next cycle will begin anew.

A cross-cutting methodological component is the Stakeholder Engagement/Participating in Systemic Intervention. This is crucial for the successful formulation and implementation of the approach; it involves creating and sustaining an active dialogue with the agents/stakeholders. Stakeholders are hence depicted at the centre of the diagram (see Figure 3) thus reflecting their participation in all the phases of the methodological process. Stakeholder participation gives credibility to the overall process, especially at the regional/local level, and through participation, stakeholders are more likely to ‘own’ the results thus increasing the likelihood of successful systemic guidance.

6 Conclusion

Based on the study of past societies, Diamond (2005: 521 ff.) argues that two types of choices have been crucial in tipping their outcomes towards success or failure: (i) long-term planning, and (ii) a willingness to reconsider societal core values. The first of those choices has depended on the courage to practice long-term thinking as well as to take bold, courageous and anticipatory decisions at a time when problems have become perceptible but before they have reached crisis proportions. This type of decision making is the opposite of the short-term, reactive one which often characterizes how decisions are made in government and private organisations. The other crucial choice informed by the past involves the courage to make, sometimes painful, decisions about core values. For instance, which of the values that formerly served a society well can continue into the future under new circumstances? Which of those considered ‘sacred’ values and positions must instead be discarded and replaced with different approaches? (Ehrlich/Ehrlich 2004; Brown 2008; Wilson 2012).

There is an extraordinary diversity of Systems Thinking as well as a great potential for harnessing this diversity in the pursuit of holistic sustainable development. The systemic regional development methodology advanced in this article is based on a Systems Thinking approach to long-term planning and action which is underpinned by a strong sustainability ethic. It thus offers a framework for strategic thinking and planning and the consideration of the ethical consequences of possible courses of action. The scale and inter-connectedness of the problematic situations confronting regional systems, its human communities and natural ecosystems are such that only well-thought systemic intervention practices can cope with. These systemic intervention practices must be ethical, take account of multiple viewpoints and be sensitive to the ecology we are a part of. Only then there is a chance of successfully tackling these problematic situations.

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