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Aims

In Book 2 we aim to:

- engage you in a case study and other examples of complex environmental decision-making situations
- introduce a range of systems concepts and techniques
- raise your awareness of some aspects of biophysical environments that are a cause of concern
- raise your systemic awareness for understanding complex situations
- demonstrate what is involved in starting off systemically in environmental decision making
- build on your understanding of models and how they can be used to describe situations concerned with environmental decision making
- enable you to recognise how a range of modelling types can aid your exploration of situations and systemic awareness
- develop your practice in formulating problems, opportunities and systems of interest in complex situations
- raise your awareness and understanding of a range of environmental legislation and schemes
- examine how more formalised approaches to environmental decision making can enhance or constrain systemic action
- develop your capacity to act (be response-able) in environmental decision-making situations (including monitoring and evaluating your own learning).

Overview of this book

The title of this course, *Environmental decision making: a systems approach*, includes several concepts. Book 1 introduced environmental decision making and detailed the aviation expansion case study. This book will introduce and develop what we mean by taking ‘a systems approach’ to environmental decision making. The focus of Book 2 is the first two stages of the T863 environmental decision-making framework (Figure 1). These stages are not sequential but iterative, and the boundaries between the two are not as clear-cut as our model might convey. (Note: the iterative process between these two stages is depicted by the arrows going through the ‘techniques and skills’ rectangle in the centre.) I recognise that the descriptions of these two stages, ‘explore (or re-explore) the situation’ and ‘formulate problems, opportunities and systems of interest’, may not be familiar to you. The language, and associated understanding and skills, are concerned with starting off the process of environmental decision making in a particular way, i.e. starting off systemically. The case for taking a systems approach will be developed by considering the complexity of most environmental issues.

Book 2 will draw heavily on the ‘Freedom to fly?’ case study presented in Book 1, using new material as well as a range of activities to capture and build on some of your main insights and questions from Book 1. In Part 1 of this book, the case study is used to introduce and explore:

- 1 what it means to start off systemically; this includes being aware of the biophysical dynamics in, and modelling of, the situation. You are introduced to different types of models and modelling; modelling is usually integral to taking a systems approach;

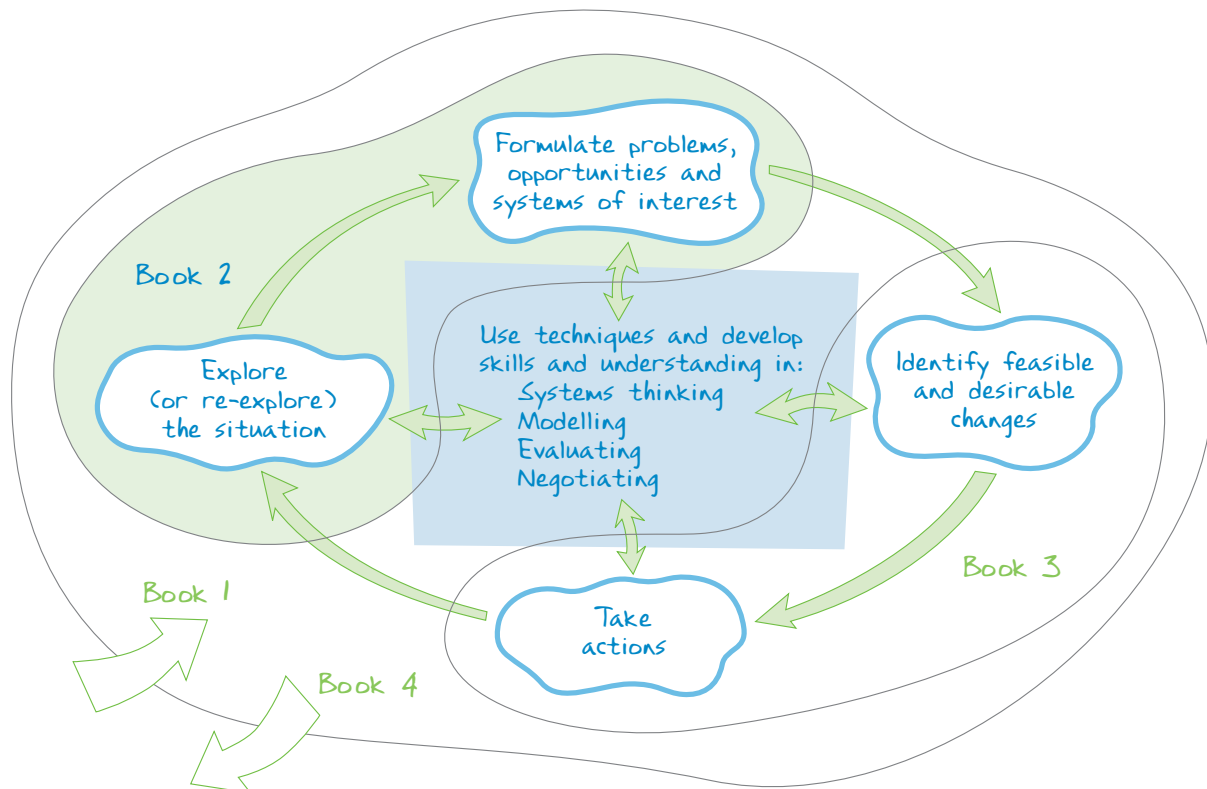


Figure 1 The T863 framework with the contents of this book highlighted

- 2 whether different environmental decisions are likely to be reached if more attention is paid to how the process is started and who participates; and
- 3 what creative tools for thinking and action can be used to start and sustain processes of environmental decision making. The DVD and *Techniques* book will be major resources for your study.

The skills needed in taking a systems approach in these first two stages include:

- 1 using systems concepts as tools for thought, creativity, communication, representation and process design
- 2 appreciating the significance of modelling
- 3 conducting stakeholder analyses
- 4 recognising and accommodating multiple perspectives
- 5 starting off the decision-making process in a participatory manner
- 6 becoming aware that evaluation of any planned action starts at the beginning, not the end, and that to evaluate some form of monitoring is required throughout to check how you are going.

You may have started this course with some awareness of, or desire to learn about, more formalised decision-making approaches such as Environmental Impact Assessment or the international standard for environmental management systems, ISO 14001. There is now a wide range of legislation and schemes which are important for environmental decision making. In Part 2, we want you to critically engage with some examples of current environmental legislation and schemes. You are asked to consider and judge how they might be used in relation to the first two stages of the T863 framework. Part of your critical engagement will concern the question of whether or not these current initiatives can be used as part of systemic environmental decision making, and if so, how.

By the end of the book you will have had a chance to further develop understanding and skills in systems thinking, modelling and evaluating (Figure 1). In Part 3 you are asked to monitor and evaluate your own learning to date.

Twelve readings are included with this book. They explore contemporary environmental decision-making situations, and introduce and develop systems ideas. Throughout the book, tools and techniques which can be used to start off systemically will be introduced; you will be guided to appropriate sections of the *Techniques* book and DVD when needed. Whilst the focus of Book 2 is the first two stages of the framework, you are invited to keep the whole framework in mind at all times.

Study note

The book is designed so that Part 1 takes three weeks of study, Part 2 takes two weeks of study and Part 3 (including time for the TMA) takes one week.

Part One Developing your systemic awareness



Introduction

Starting off systemically means being both systemic and systematic – these are the two adjectives that arise from the word ‘system’. The word system comes from the Greek verb *synhistanai*, meaning ‘to place together’. A system is a perceived whole whose elements are ‘interconnected’. Someone who pays particular attention to the interconnections is said to be systemic (a systemic family therapist is someone who considers the interconnections amongst the whole family; the emerging discipline of Earth Systems Science is concerned with the interconnections between the geological and biological features of the earth).

On the other hand, if I follow a recipe in a step-by-step manner then I am being systematic. Medical students in traditional courses on anatomy often take a systematic approach to their study of the human body – the hand, leg, internal organs, etc. – but at the end of their study they may have very little understanding of the human body as a whole because the whole is different from the sum of the parts.

Systemic awareness comes from understanding:

- 1 ‘Cycles’, such as the cycle between life and death, various nutrient cycles and the water cycle – the connections between rainfall, plant growth, evaporation, flooding, run-off, percolation, etc. (Figure 2). Through this sort of systemic logic, water availability for plant growth can ultimately be linked to the milk production of grazing animals and such things as profit and other human motivations. Sometimes an awareness of connectivity is described in the language of chains, as in ‘the food chain’ and sometimes as networks, as in the ‘web of life’. Other phrases include ‘joined up’, ‘linked’, ‘holistic’, ‘whole systems’, ‘complex adaptive systems’, etc.
- 2 Counterintuitive effects, such as realising that floods can represent times when you need to be even more careful about conserving water, for example the shortages of drinking water in the New Orleans floods that followed Hurricane Katrina in 2005.
- 3 Unintended consequences. Thinking about things systemically can often minimise these. For example the designers of England’s motorways did not plan for what is now experienced on a daily basis – congestion, traffic jams, emissions, etc. These unintended consequences are a result of the gaps in thinking that went into designing and building new motorways as part of a broader ‘transport system’.

Peter Senge (1999) captures the idea of systemic complexity in the following terms:

Businesses and other human endeavours [can also be viewed as] systems. They, too, are bound by invisible fabrics of interrelated actions, which often take years to play out their full effects on each other. Since we are part of that lacework ourselves, it’s doubly hard to see the whole pattern of change. Instead, we tend to focus on

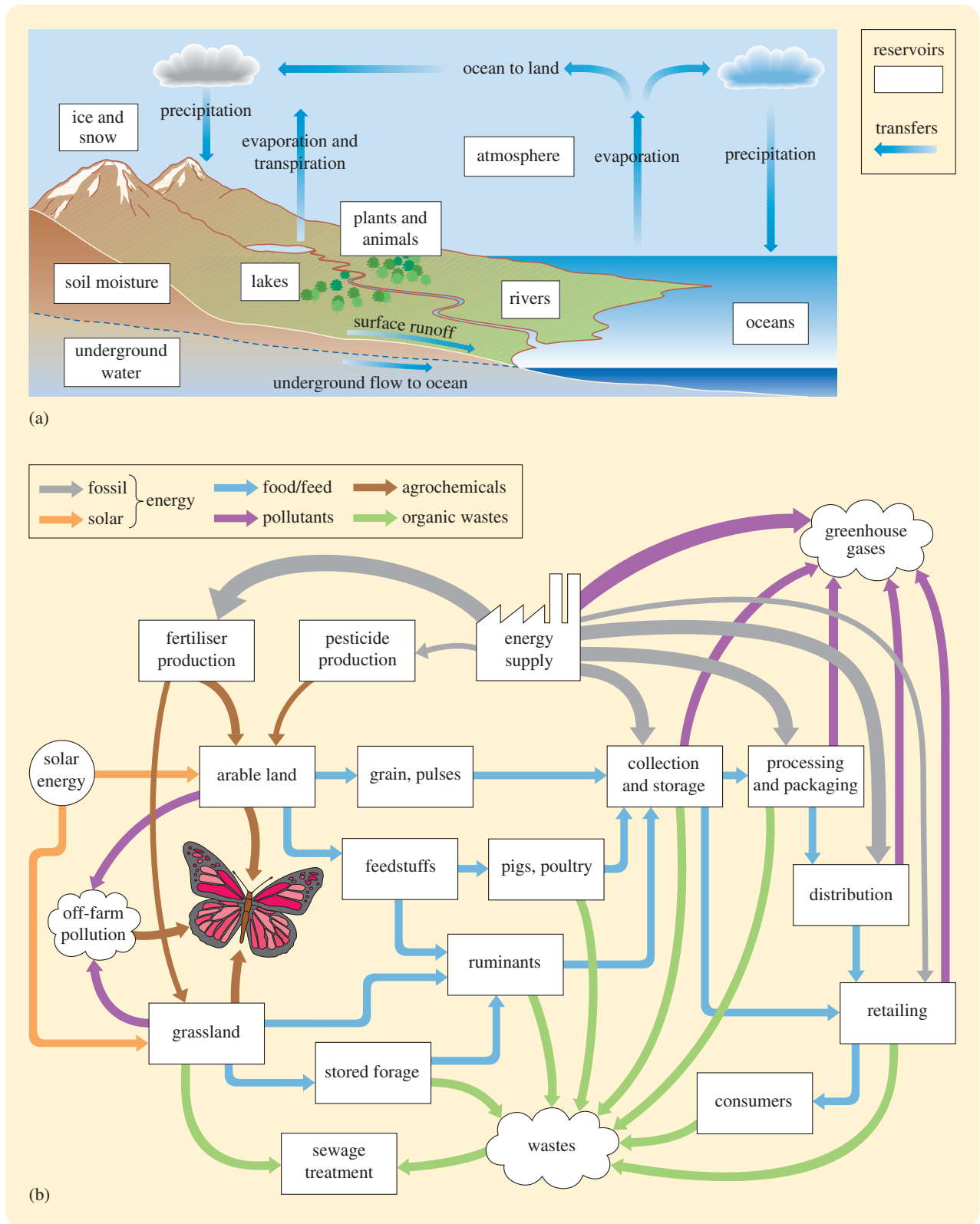


Figure 2 (a) A model of the water cycle depicting the connections between the different elements and (b) a model of a food chain (Sources: a: The Open University, 2003; b: Morris, 2005)

snapshots of isolated parts ... and wonder why our deepest problems never seem to get solved. Systems thinking is a conceptual framework, a body of knowledge and tools that has been developed over the past fifty years, to make the full patterns clearer and help us see how to change them effectively.

(Senge, 1999)

A primary aim I have for Part 1 is to help you to develop your systemic awareness for analysing and understanding complex environmental decision-making issues. To test out your own systemic awareness of an everyday activity, try Activity 1; it is not essential that you complete this activity before moving on but it is worth trying it at some time. I will return to the notion of ‘systemic awareness’ in Part 3, after you have had an opportunity to develop your own understanding and skills based on the ‘Freedom to fly?’ case study, material on climate change and the carbon cycle and other examples.

Activity 1 The food on your table – an environmental web

Following a meal, take time, with your fellow diners, to explore the material and money flows and connections that brought two or three specific food items to your plate. Discuss the systemic connections and possible unintended consequences. As you do so, note some potential or actual environmental issues that you or others around the table are aware of. To highlight systemic connections you might care to think about various elements (things, products, people) and connections (links between elements, e.g. transporting).

This activity is best done with friends or family, i.e. in a group.



Make some notes in your learning journal about what you learned from doing this activity. You may also like to post to the T863 computer conference about how you found this activity.



Study note

If you haven't yet made use of the T863 computer conferencing facility, now would be a good time to start. Instructions and software are provided. Look in the Course Guide for further details.

The stage of the T863 framework called ‘exploring and re-exploring a situation’ is a particular approach to engaging with a situation that is experienced as complex. It involves stepping back from the hasty naming of a problem or opportunity within that situation, particularly if the naming is done by those with a narrow perspective or vested interests. An example might be the naming of the problem which led to the flooding of New Orleans following Hurricane Katrina in 2005 as ‘the failure of levees’ and thus purely a question of engineering. Most would agree that the situation was more complex than this as the following quote exemplifies:

Katrina was a man-made disaster even more than a natural one. It was not the hurricane alone that caused the devastation in New Orleans. It was the hurricane plus the absence of the wetlands that should have buffered the city from the storm.

Every 2.7 miles of wetlands reduces a storm surge by about one foot. Louisiana has been losing wetlands equal to the size of Manhattan every year. You don't need a slide rule to see where that calculus leads.

It's not malls and vacation homes that are destroying these wetlands, as in other parts of the country. In Louisiana it's largely oil. Offshore drilling has required the dredging of large canals, which enable salt water to flow into the marshes and cause land to sink. The other culprit is the extensive system of levees built to protect New Orleans from the Mississippi floods. These floods used to carry sediment into the marshlands which nourished and replenished them.

No floods means no replenishment. What used to be a buffer zone is now just open water, and a clear shot for the hurricane that experts have been warning of for years.

(Rowe, 2005)

Consider Figure 3. What I particularly like about this cartoon is that it conveys a number of systemic insights which can be connected to the first stages of the T863 framework. A simple systematic reading of the cartoon could be that tourism causes development which in turn causes pollution. Such a reading would be simplistic, though. The cartoon reveals the following insights for me:

- 1 The interconnectedness of human action with environmental change.
- 2 The image of the sun reminds me that life on earth is driven by photosynthesis and is carbon-based; each scene depicts different aspects of human modification of the carbon cycle.

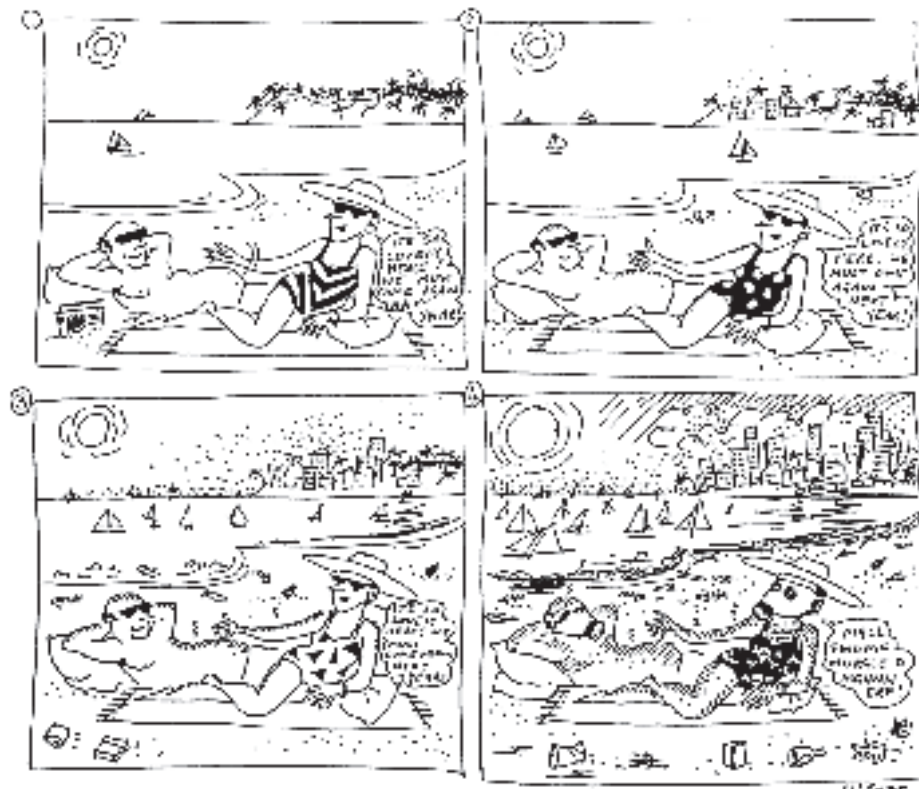


Figure 3 The consequences of not engaging in environmental decision making using a systemic approach? (Source: O'Brien, 1990)

- 3 The notion that human behaviours co-evolve with their environment, i.e. the final scene depicts the use of technology (gas masks) to maintain adaptation to the situation (I take the perspective that evolution unfolds every day, even though it can only be seen in hindsight over long periods).
- 4 The operation of what is known as feedback processes – an ideal setting becomes popular (possibly by the use of cheap air travel), is increasingly spoiled by the influx and impact of tourists on infrastructure, natural environment, costs, congestion, pollution, etc., and ultimately destroys itself as a desirable destination (you will be asked to look at feedback processes in more detail in Section 3).
- 5 The cartoon also implicitly invites the reader to reflect on what we humans do to our surroundings when we act in particular ways and resort to technology to maintain behaviour which degrades our environment.
- 6 A simple systematic or deterministic reading of the cartoon would also conceal the idea that we humans are capable of learning and thus changing behaviour in purposeful ways. Examples might include taxing aviation, the design of an ecotourism resort or putting quotas on visitors to a particular location.

The material in Book 2 will equip you not only to understand situations such as that depicted by Figure 3, but also to begin to move beyond understanding to action. However, before asking you once again to engage with the case study, I want to raise your awareness of the systemic nature of climate change and the underpinning carbon cycle.