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## Living with the big picture: a systems approach to citizenship of a complex planet

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4

## **Living with the big picture - a systems approach to citizenship of a complex planet.**

*Chris Blackmore and John Smyth*

The idea of global citizenship may conjure up many images but it would be difficult to dissociate it from *both* people *and* the planet Earth. However, reconciling the different priorities that people attach to issues of human society and welfare with the qualities and constraints of our physical and biological environment is easier said than done. In our experience there has been a tendency among those who focus on global issues to polarise between human and non-human dimensions, often with little recognition and understanding that the two ends of the spectrum are now interdependent (Smyth, 1995). Against this background becoming a citizen of the globe, with the inference that individuals take responsibility for the effects of their actions, seems an immensely challenging goal. Human behaviour is much less governed than that of other inhabitants of the Earth by patterns laid down by natural selection and adjusted by fine-tuning to their particular environment during a relatively standardised process of development. Humans have capacities to adapt the environment to their own perception of needs. Skills are required to be able to understand how 'the wood' as well as 'the trees' are faring, to

understand the inter-relationships and to know whether, when and how to intervene, or to stop intervening.

As humans we have many choices to make about how we live in the world. Our decisions and actions are underpinned by what we know, believe and value and we are influenced by events taking place around us, at many different levels. Few would dispute that most of our activities affect others and our environment, both in and beyond the immediate locations in which we live. Many of us recognise, for instance, that there are effects associated with our use of natural resources or disposal of wastes. But the nature of these effects, what we can do about them and whether or not they matter, are questions that are harder to understand and to judge. In order to address them there is often a need to get away from reductionism and linear 'cause and effect' thinking, which although very useful tend to prevail in our society and are often used inappropriately. More 'systems thinking' is needed, to make sense of the complexity we experience in the world. How we can use systems thinking to act in ways that take account of both human and non-human factors of global citizenship is the main topic of this chapter.

### ***Interconnections***

There are many interconnections between ourselves and our environmental systems. These were crystallised by the World Conservation Strategy (IUCN et al 1980) into the maintenance of life support systems, the maintenance of biodiversity and the sustainable use of renewable natural resources. The first of these recognises the whole biosphere as a unitary system (Spaceship Earth), the second comprises the intricate machinery needed to keep it operational through conditions which change in both short and long term, the

third gives sound advice to its human occupants on how to survive as dependent parts of it, and introduces the concept of sustainable development. Our continuing existence as global citizens depends on each of these.

It would be naive to suggest that, in our attempts to achieve global citizenship, we can do more than learn our way to achieving more sustainable relationships with other parts of what we experience as a highly complex planet. Water, for example, is one of the components of our environment on the supply of which we are wholly dependent. This issue has now reached the top of many international agenda, including those of the UN Commission on Sustainable Development, which meets annually in New York to review progress on the action plan (Agenda 21) to which Governments signed up in Rio de Janeiro in 1992 (Quarrie 1992).

Water is essential to life. It is a renewable resource at a global level because it has a natural cycle and can be re-used for different purposes, but supplies of freshwater are finite.

“At the beginning of the 18th century, there were less than a billion people in the world sharing less than a million cubic kilometres of freshwater. In 1900, there were about 2 billion people sharing the same amount. Now there are more than 6 billion people and the freshwater supply has remained constant.” (Klaus Topfer, UN Under-Secretary General and Executive Director, UNEP 1998).

At regional or local levels in many parts of the world, freshwater is a scarce resource imposing constraints on human action and threatening both life support and biodiversity. This scarcity may be due to drought conditions or because it has been degraded through pollution or salinisation. Many large cities around the world are dependent on groundwater and increased demand has led to declining water levels and quality in urban aquifers. How and how much water is used by people in one area may affect how and whether it may be used elsewhere. There is competition for freshwater at different levels, ranging from international to local, and managing its supply and use has become a complex process.

The late Sir Geoffrey Vickers, in 1966, described the following situation:

“For many millennia the River Thames has earned its name as a continuing entity. It is in fact the way in which water from a stable catchment area finds its way to the sea. It expresses the relationships, changing but continuous, between rainfall, contours and porosity of the area, vegetation and a host of other physical variables.

Throughout this time until very recently its valley provided a habitat for many species, including men, who long ago learned to live above its floodmarks and to cultivate its alluvial soil. Then we began to incorporate this river, once an independent variable, into our own man-made socio-technical system. We controlled its floods with barrages and dykes. We adapted it for transportation. We distributed its water. We used it as a sewer. Our demands rose and began to conflict with each other, making necessary, for example, the control of pollution. Now these demands have begun to conflict in total with the volume of the river. We plan to supplement it by pumping out deep reservoirs. Soon,

unless some other solution appears, we shall be supplementing its flow by pumping desalted water from the sea. By then the Thames as an independent physical system, part of the given environment, will have virtually disappeared within a human socio-technical system, dependent on new physical constructions, new institutions, and a new attitude to the use of water and the regulation of the whole water cycle.” (Vickers 1966: 76 - 77).

Such a scenario could also be described in many other natural resource contexts that are associated with global citizenship. Resources such as air, water and land can be used in many ways and their use optimised but they remain relatively fixed in terms of their capacity. Their quality for the purpose of supporting life can either be sustained or degraded. Managing such resources, where there are multiple stakeholders and interconnections among social, economic and environmental factors, requires an approach that goes beyond analysis of individual components of the relevant systems, be they people, physical resources or both. It is necessary to consider whole systems in the context of larger wholes and to understand the inter-relationships and the systemic effects of different courses of action. It is our view that systems approaches offer a great deal to help develop understanding of complex situations, and how to act within them as global citizens in a way that takes account not just of human elements but of the non-human elements on which we depend.

### ***Taking a systems approach***

By taking a systems approach we mean using systems thinking, which in this case means systemic (a property of the whole) rather than systematic (linear step-by-step) thinking to inform action. We shall say more about what we mean by systems thinking later in this

chapter but in brief it can be captured by considering an entity or situation within the context of a larger whole. In our example of freshwater, using systems thinking in our decision making may mean becoming more aware of the context of household water supply and the effects of using and disposing of water (not just at a local level but also much further afield). In turn, this may lead to some modification of our use of freshwater to take account of our environment and the needs of others. This action is consistent with ideas of global citizenship, particularly those of being aware of the wider world, taking action to make the world more equitable and taking responsibility for our own actions.

There is no guarantee that people who have a good understanding of their system of interest within the context of a larger whole will act on that understanding, or if they do, how they will act. Many factors affect our decisions and actions, including values, beliefs and personal circumstances. However, we suggest that learning to take a systems approach can help people, who wish to do so, to learn to become global citizens in terms of harmonising their behaviour with these many factors. In this context, taking a systems approach involves thinking in terms of being part of a system rather than a separate entity; appreciating a range of different perspectives and motivations as well as one's own and understanding relevant interconnections. Our perspectives on the world are partial and we cannot understand the whole unless we take multiple perspectives into account. Yet, there seems to be limited recognition of this among humankind and many do not appear to recognise that we are only a part of a global system of life-support processes sustained by biodiverse machinery.

***What do we mean by 'system'?***

We have already used the word 'system' several times and now want to make clear what we mean. 'System' is a part of general everyday language and like so many other words relating to global citizenship, such as environment, development and sustainability, it is used in a range of different ways. We use it in this chapter in a specific sense. By a system we mean a whole entity that has a boundary. Outside the boundary is the system's environment. The system and its environment are always structurally coupled so the system's environment and the system interact. The system may have sub-systems or may be a sub-system of a larger system. The use of the term system to denote a whole, where the properties of the whole differ from those of its parts, goes back many years and systems theory has come from a synthesis of ideas from many different disciplines. We use the word system in the sense that it is a combination of interconnected elements and processes, which together form a whole that has a purpose. These elements and processes are affected by being within the system and the system would be affected by removing them from the system. This definition is similar to those used in several Open University courses (Open University 1984, 1991, 1997) and by a range of systems authors.

(Checkland 1984; Ison 1993; Capra 1996; Clayton and Radcliffe 1996).

It also seems worth noting that there are different ontological (nature of reality) assumptions that underpin different epistemological (how it is we know) perspectives regarding systems. Some believe systems exist in the so-called real world and that a system's purpose also exists and is not necessarily attributed by an observer. Others believe that systems do not exist out in the world but are always constructs in people's minds, with the system's purpose attributed by one or more observers in conformity with a particular worldview. Yet others fall somewhere between the two. We do not claim



ontological and epistemological neutrality in outlining this range of beliefs. We both fall between the two extremes in our own beliefs and have found the idea of systems as constructs very useful in our own practice, which has clearly influenced how we have presented our arguments in this chapter. However, we do claim that whatever the belief - whether it is that systems and their purposes are 'out there', in the mind or between the two - it is possible to recognise that different people will identify different boundaries between what lies inside and outside their systems of interest. They may also see different relationships between them because of their different worldviews and the different purposes they have in mind in defining these systems. In the context of global citizenship it is also arguable that there is sufficient commonality in human experience for agreements to be reached among groups of people about the purposes of systems and where their boundaries lie.

In considering unique environmental and planetary systems at a global level, such as those that encompass the oceans, the atmosphere or the whole water cycle, questions of existence and purpose seem rather different questions from those faced when considering much more localised human activity systems, such as those that focus on, say, agriculture at a local level. However, human activity has had its effects on the most remote parts of our planet and perceptions of oceans and atmosphere as systems are still held only by humans, so it is possible to consider even unique whole planetary systems as human activity systems with different perceptions of boundaries, at least in part. In order to draw human and non-human factors together it is important not to think of them as just parts of separate systems but as different parts of a whole.

Take an example closer to home to consider the question of identifying different boundaries and purposes. Aberdeen University may be thought of as a system with its Faculties as sub-systems. It may also be thought of as a sub-system of a system of Scottish Universities. Even in this example, it is possible to see that different people would place different boundaries around any one of these systems and sub-systems. The purpose of Aberdeen University may be expressed in many different ways, for instance as a system to enable its students and staff to achieve a specific range of learning outcomes, which may be underpinned by the worldview that includes valuing those particular learning outcomes. Alternatively, it may be thought of as a system to provide employment in the Aberdeen area, which may be underpinned by a different worldview. In each case it is possible to identify different elements and processes as part of that system and different relationships between them.

***What and whose systems are relevant to global citizenship?***

At a global level it is arguably beyond the capacity of humankind to reconstruct whole systems, at least in physical terms, except in details. Major changes in how we live our lives took place in the late twentieth Century. They resulted in gross alterations to the properties of the Earth's surface, contamination of air, water and land by irregular and complex deliveries of unwanted products of our activity (waste), and overexploitation of its natural resources for food, fuel and raw materials. So how do we reconcile certain types of human activity with the limits of the Earth's capacities to sustain life? How can we ensure that systemic effects of our actions be recognised in our planning processes?

Will the gain of one group be the loss of another or can we learn our way to 'win-win' situations?

Norman Uphoff, an academic and development practitioner from Cornell University, is among those who has commented on the need to consider open and closed systems, particularly to recognise positive-sum (win-win) rather than zero-sum (win-lose) or negative-sum (lose-lose) dynamics (Uphoff 1995, 1996). Systems may be considered open or closed in terms of matter, energy or information (Boulding 1971.) A closed system is one that is closed to inputs from and outputs to its environment. The metaphor 'Spaceship Earth' came largely from thinking of earth as a closed system dependent on its own resources. The idea of closed and open systems seems very relevant to global citizenship. Whether we perceive systems at levels below the global level as open or closed seems likely to determine our actions.

In one of his papers (Uphoff 1995) concluded that

'However limiting physical resources may be, our minds are more constricting and they are where we should look for solutions to our various resource scarcities and constraints.'

Others have written in similar vein, for instance Ervin Laszlo (1998) who discussed the links between the outer and inner dimensions of globalization.

"...we need to take into consideration another dimension of the globalisation process: the "inner" rather than the "outer" dimension. The outer dimension...is the evolutionary system-building process heading toward a globe-spanning and globally interdependent socio-

economic and ecologic system. The inner dimension, on the other hand, is the human dimension: it consists of the way people perceive the globalization process and the way they and their societies internalize it in their culture. The inner dimension decides whether the outer dimension is oriented to move along humane and sustainable pathways, or whether it leads to mounting crises, and ultimately disaster.”

These comments are also a reminder that different perceptions are products of interactions between external and internal environments and that people will make different selections and interpretations in relation to their environment which will affect what systems they perceive to be relevant to a situation.

There are many examples to show that how we think about and structure what we experience in the world can determine our actions. Taking an example from our own practice, if we drew boundaries around our ‘environmental education’ system to include only formal sector education we would perceive stakeholders to be a particular group of people. However, an environmental education system that included non-formal education would include others in the educational community from a wide range of non-governmental organisations. Similarly if we adopted a narrow meaning of environment that was biased towards either non-human or human elements we might also identify different stakeholders from an environmental education system that adopted a broader definition. These boundaries would be significant if, say, we wanted to involve stakeholders in developing educational policy to help address an issue such as transport.

Another example may be how Oxfam appears to see Global Citizenship. One of their summary documents includes the following:

*“The Global Citizen.*

Oxfam sees the Global Citizen as someone who:

- is aware of the wider world and has a sense of their own role as a world citizen;
- respects and values diversity;
- is willing to act to make the world a more equitable and sustainable place;
- takes responsibility for their actions.”

Source: Oxfam (1998) p2

*The key elements for responsible Global Citizenship*

*Knowledge and understanding*

- Social justice and equity
- Diversity
- Globalisation and interdependence
- Sustainable development,
- Peace and conflict

*Skills*

- Critical thinking
- Ability to argue effectively

- Ability to challenge injustice and inequalities
- Respect for people and things
- Co-operation and conflict resolution

*Values and attitudes*

- Sense of identity and self-esteem
- Empathy
- Commitment to social justice and equity
- Value and respect for diversity
- Concern for the environment and commitment to sustainable development
- Belief that people can make a difference.

Source: Oxfam (1998) taken from figure on p3

The intended curriculum clearly covers a broad range of knowledge and understanding, skills, values and attitudes that are highly relevant to the discussion on Global Citizenship. The detail given in the teachers' and education guide from which the above extracts have been taken gives a much fuller picture. But judging the way in which Global Citizenship is being considered just from these lists alone, it seems to us that some of the non-human factors are implicit rather than explicit. It would be interesting to hear what systems those who have developed and used these lists would consider relevant and whether different boundaries would be drawn by those using them if some of the non-human factors, on which human activities depend, were made a little more explicit.

Working out what systems are relevant in problem situations, where people are seeking to take purposeful action, has been one of the focuses of Soft Systems Methodology (SSM) which was designed and developed by Peter Checkland through a long-standing action research program at Lancaster University. One of Checkland's reflections on selecting relevant systems is that 'No human activity system is intrinsically relevant to any problem situation, the choice is always subjective. We have to make some choices, see where the logical implications of those choices take us, and so learn our way to truly 'relevant systems'.' (Checkland and Scholes 1990). SSM includes describing systems of interest in terms of the mnemonic 'CATWOE',

<u>C</u> ustomers	the victims or beneficiaries of T
<u>A</u> ctors	those who would do T
<u>T</u> ransformation process	the conversion of input to output
' <u>W</u> eltanschauung'	the worldview that makes this T meaningful in context
<u>O</u> wners	those who could stop T
<u>E</u> nvironmental constraints	elements outside the system which it takes as given.

Source: Checkland and Scholes 1990:35.

A human activity system can as a result be given a series of different definitions depending on what is perceived as its purpose (that is the transformation process that is central to it), its underpinning worldview, what is constraining it and who is involved. One example could be a system to reclaim glass bottles for recycling, which could be described much more specifically through a 'root definition' as

'A local authority-owned and staffed system to enable members of the public to return glass bottles they have used so that they can be reprocessed rather than going to landfill.'

C = members of the public

A = local authority and members of the public

T = used and dispersed glass bottles to collected glass bottles for recycling

W = it is more desirable for glass bottles to be reclaimed and recycled than for them to go to landfill

O = local authority

E = technical feasibility of recycling, market for reclaimed glass

This is a simple example but CATWOE can be used in much more complex situations as a way of making more apparent what is going on, why and who is involved. Even with this example some of our assumptions become apparent. Use of CATWOE is only one part of SSM and there is not the space here to go into the detail or give examples of how it works in practice. The process of drawing out the details of transformation, worldview, who is involved etc may be considered systematic but it is part of a methodology that can be used systemically. Many people have used SSM, and other systems methods and methodologies, to gain insights into their systems of interest and what actions may be appropriate. By using simple examples in this chapter we are not trying to suggest that systems approaches provide quick and easy solutions to problems in complex multi-stakeholder situations. Nor are we suggesting that they should necessarily replace other approaches. We are saying that systems methods and methodologies provide ways of taking multiple partial views of a whole system, recognising underlying assumptions and



worldviews and working out what and whose systems are relevant to a situation. As such, systems approaches have been found to be useful not just for understanding situations but in helping in negotiation processes and in resolution of issues.

One example of working out what systems are relevant in the context of global citizenship comes from Agenda 21, which has been taken up by many people who are trying to operate as citizens at different levels, local, national and global. The Commission on Sustainable Development (CSD) has responsibility for following up Agenda 21's many recommendations at an international level. The decision-making processes of the CSD have evolved since 1992. There have been many negotiations and much drafting and re-drafting of documents in this international arena. In general, the approach has not appeared to be systemic. More systems thinking among participants would probably have been useful. Attention has been given to cross-cutting issues, participation of representatives of many different stakeholder groups and initiatives such as the Committee of the Whole (COW). But in breaking down Agenda 21 to its constituent parts in attempts to implement and monitor, some vital links have either not been made or not sustained. Among them are links between educators and carers for the environment and those within Governments among different departments with responsibilities for environmental sustainability, economic development and social justice. It is therefore perhaps not surprising that many of Agenda 21's issues still remain unaddressed and the holistic vision of Rio seems once again to have become fragmented and arguably less of a threat to established ways of doing things. (Harvey 1995; Smyth et al. 1997; Blackmore and Smyth 1998).

### *System levels and emergent properties in relation to global citizenship*

Norman Uphoff's insights into systems came from many years of working in agriculture in developing countries. He is one practitioner who has focused not just on elements of systems but on trying to gain understanding of the relationships between them.

“Anyone who works in and on irrigation systems comes to appreciate the interconnectedness of physical and social systems (which are really subsystems), with irrigation itself becoming understood as a socio-technical enterprise (Uphoff 1986: 3-11). The physical aspects of irrigation need to be disaggregated into a number of subsystems - soils, crops, water (hydraulic), structures (engineering) and likewise the social and organizational elements - administrative systems, households, farm enterprises. And all irrigation systems exist within larger ecosystems and are affected by factors like rainfall, topography, nutrients and microorganisms and competing water uses. Systems thinking should come naturally to engineers, administrators, social scientists and others who deal with irrigation, because of the manifold connectedness of components. But despite use of the word ‘system’ as a descriptive term, there is little explicit consideration of the implications of the nestedness and interaction of subsystems and systems.”

Figure 1 is a systems map we have drawn of the irrigation system described by Uphoff.

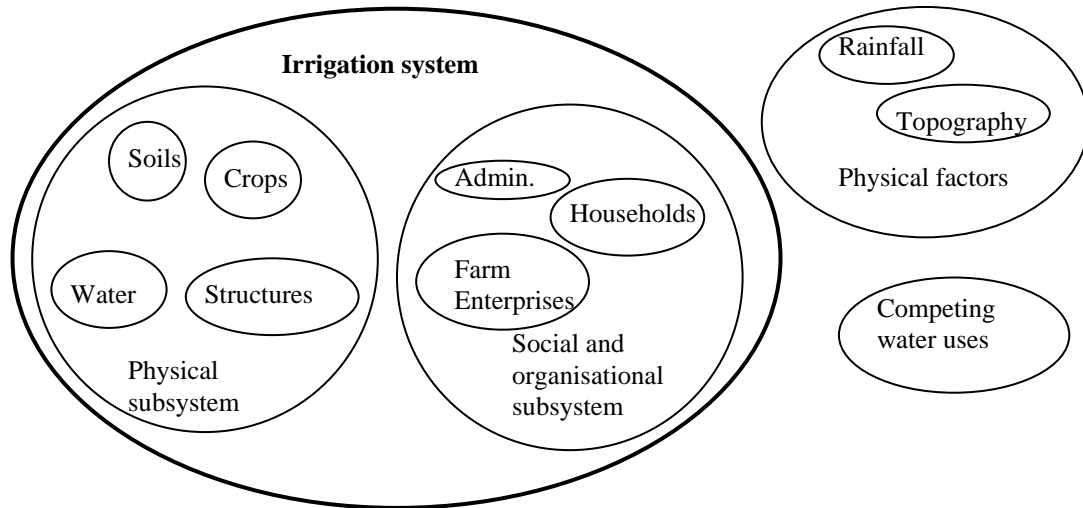


Figure 1 Systems map of an irrigation system

The concept of system levels seems central to global citizenship, where individuals who may become global citizens also operate at a range of other levels. It is an important one to consider because systems often possess emergent properties that their sub-systems do not. One classic example of emergent properties is that of the wetness of water, when the gases hydrogen and oxygen combine. The emergent properties of a system are unpredictable and cannot be understood just by analysing the parts of the system. The idea of emergent properties extends into many situations and they are sometimes discussed as environmental surprises (for example by Myers 1997 and Kates and Clark 1996). Ozone depletion, for instance, can be considered a surprise at a system level that allows relatively inert chlorofluorocarbons to be released from refrigerators and break down into simpler substances in the upper atmosphere during the polar winter, which then destroy ozone when the sun returns in spring. (Though ozone depletion could also be thought of quite differently, depending on what systems are being considered, by whom and for what purpose.) Another example from our own experience was when the

sub-systems of environmental and development educationalists in the UK got together to prepare and later follow up educational objectives of the Rio Earth Summit as the Education for Sustainability Forum. Environmental and development educationalists focus on many of the same issues of people and their environment, albeit with different emphases. While there may be as much variation within these subsystems as between them because of different interests and understandings of environment or development, it seems to us that a system that includes them both and allows them to interact shows quite different properties from its subsystems.

It will not be possible to predict what properties may emerge at different system levels in different people's global citizenship systems. But it may help to think systemically and to recognise different system levels to work out how to facilitate interaction and to realise that these systems will not simply be a sum of their parts. The interdependence of humankind and its environment means that global citizenship cannot be achieved through concentrating on human factors alone. It is essential that political, economic, social, biological and physical dimensions be seen as parts of one system so that we recognise the effects of our actions. While we have scope to construct and reconstruct many systems, both physically and conceptually, and to be creative, efficient and ethical in our endeavours, there are limits to what we as humans can use, pollute and control. We believe that a systems approach to global citizenship has much to offer both to help us in working out our future actions for global citizenship and in recognising where these limits lie.

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## Questions

- 1 Why do the authors seem to think that more systems thinking is needed to make sense of the complexity people experience in the world?
- 2 Draw a systems map (of the type shown in Figure 1 in this chapter) of one of your global citizenship systems of interest. Be sure to label the diagram clearly showing the boundaries of your system and its subsystems and what lies in its environment.
- 3 Say why you think your system of interest is relevant to Global Citizenship.
- 4 The authors state that they think the idea of systems levels is central to global citizenship. Why do they appear to think this? Do you agree?
- 5 Can you identify any emergent properties at different levels in your system of interest?