



Faculteit der Sociale Wetenschappen

# The unbearable **heaviness** of humankind

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# The unbearable heaviness of humankind

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*Inaugural address of dr. Josee van Eijndhoven  
on accepting the chair in Sustainability Management  
at the Research Institute for Transitions (Drift),  
Erasmus University Rotterdam*

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## The unbearable heaviness of humankind

Mister rector magnificus, ladies and gentlemen,

Today exactly 12½ years ago, on April 19, 1995, I was standing behind a similar lectern to give an inaugural address, at Utrecht University. Its title was: “The unbearable lightness of the debate” (Van Eijndhoven(1995)). Today my subject is of a heavier substance: it is “The unbearable heaviness of humankind”.

What is the problem? Today 6.7 billion people live on earth, and hopes are that the number will stabilize, probably at 9 to 10 billion. But even if that happens, it will take at least some decades. Of these people only a relatively small part enjoys a western standard of living. Countries like India and China are growing fast. They will therefore absorb an ever larger part of resources.<sup>1</sup>

For the moment we have only one planet to live on. It has become evident that our ecological pressure on the planet is enormous. The impact of our species is clearly visible from space, and will, most probably, also lead to changes in climate, with grave and, possibly, catastrophic effects.

Our incredible impact entails a huge responsibility. The human footprint on earth should not become too large. If it does, ecosystems may find a way without us.

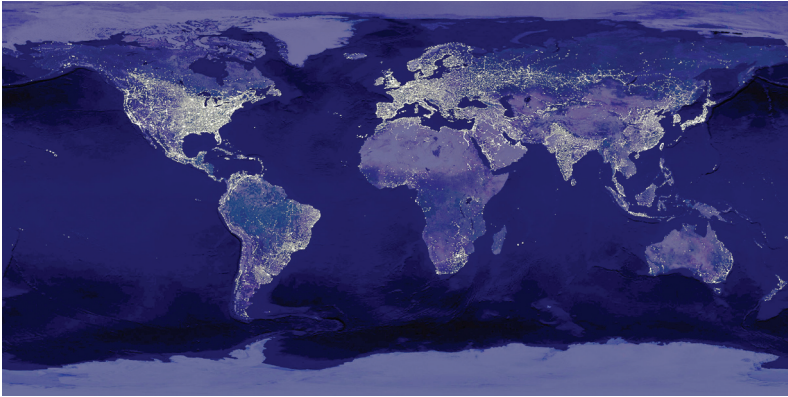
During the last year I visited a number of international conferences that were attended by ministers, natural and social scientists, industrialists, NGOs and the media.<sup>2</sup> The consensus at all these conferences was that climate

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1 They will, for instance, start eating more and more meat. In producing meat a large amount of resources is being used. This becomes clear when the whole chain of production is taken into account. For the production of soybeans many forests are being cut down and soy is being used for feed. For that reason the consumption of meat, in the end, leads to negative impacts on climate.

2 These conferences were, respectively

1. the AAAS (American Association for the Advancement of Science) conference in San Francisco, February 15-19, 2007.



**Figure 1** *Photograph of the illuminated earth*

[http://visibleearth.nasa.gov/view\\_rec.php?id=1438](http://visibleearth.nasa.gov/view_rec.php?id=1438) (approached October 11, 2007)

change requires urgent action *now*. The Nobel prize for Peace for Al Gore and IPCC<sup>3</sup> shows that the Nobel committee is of the same opinion.

The present direction of development cannot be called sustainable. Enormous changes are needed lest we enter into perilous zones for nature and humankind. Is it possible to realize such changes, and how? Can researchers like us at Drift (the Dutch Research Institute for Transitions) make a contribution?

At the end of this lecture I will formulate an answer to these questions, but first I will discuss a number of challenges we are being confronted with:

- the problems we face are complex
- people have to be mobilized
- major changes (transitions) are needed.

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2. The Apeldoorn Conference (1-2 June 2007), where people from science, Policy and industry in the UK and The Netherlands meet biannually. The initiative to start these conferences was taken by Tony Blair and Wim Kok, the then prime ministers of both countries.
  3. The STS (Science, Technology and Society) Conference in Kyoto October, 7-9, 2007. The invitees to this conference are ministers, directors of companies and presidents of universities and researchers (among which a number of Nobel prize winners).
  - 3 Summaries and older reports of IPCC can be found at: [www.ipcc.ch](http://www.ipcc.ch)



## Shifting problems: towards complex issues

In the course of history, people have been able to creatively move beyond previous limits. In human history as a whole one may speak of four phase transitions. First, humankind was able to domesticate *fire*. Ten thousand years ago the *agrarian era* started. And some two hundred years ago the *industrial era* took off. The 'Hollandsche Maatschappij der Wetenschappen', the original Dutch Academy of Sciences, preceding the Napoleonic, now Royal Netherlands Academy of Arts and Sciences, is now speculating upon a worldwide shift toward a *socio-ecological era* (De Vries and Goudsblom(2002)).<sup>4</sup> We are reinventing our dependence on ecological systems. The industrial era is encountering limits, because we did not realize sufficiently this dependency and did not translate it into conditions which our industrialized society should obey.

Up till now, people have often succeeded to push back frontiers by tackling large-scale challenges societies were facing in novel and innovative ways. To mention just a few examples: When European forests became extinct, peat and later coal were used as new sources of energy. Agricultural productivity has been growing rapidly over the last few decades.<sup>5</sup> Once more, we are facing

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4 De Vries and Goudsblom use the term 'regime' instead of 'era'. At the Dutch Research Institute for Transitions 'regime' is the term used for phenomena at a smaller scale. For what I denote as 'era', the term within Drift is 'landscape'.

5 These examples are about deficits and about technological development. Other drivers for changing practices may also be important. Spivey (2005), for instance, argues that people found creating time for producing art so important that it became a reason for developing agriculture. In my view the hypothesis is rather speculative, but it is –of course- not the first time that in the end speculations become generally accepted theories.

serious challenges with respect to energy and the sustainability and security of food production.

Past experience enables us to be optimistic about future *possibilities*. But historically the tide has not always been turned on time. Environmental problems have led several times to the end of civilizations (Diamond (2005)). Everybody recollects the example of Eastern Island, where deforestation has led to the end of human inhabitation. But also Maya culture was finished off by a combination of environmental problems and short-sighted leaders (Diamond, p. 176–177).

For the first time in the world's history our impact on geo- and ecosystems is assuming *global* dimensions: the environment worldwide is being affected. Climate is an important example, but also biodiversity and the stratospheric ozone hole can be mentioned. How can we learn to turn the tide and mitigate or even avoid these worldwide effects?

From my own experience and research I now can overview a history of about fifty years of thinking about the environment. It is abundantly clear that the issues have changed over time. The soot on the cleaned laundry during my youth in industrial Tilburg, when the wind was blowing in the wrong direction, is almost forgotten. It also took some time before this kind of pollution started to be viewed as a problem, because at the time smoking chimneys were a sign of wealth.

In 1962 Rachel Carson wrote *Silent Spring*. This book was an important trigger to start taking unwanted side effects of chemicals into account. The most important example was DDT. In the Second World War DDT saved many lives, because it killed mosquitoes. But, due to its persistence in the environment it had serious side effects high in the food chain, for instance for birds of prey.

The novel point made by Carson was that she drew attention to effects that were not immediately visible. In most cases animals were not immediately intoxicated, but they suffered from indirect effects. For instance, birds of prey had more difficulty reproducing because of thinner egg shells. Carson also showed that effects can show up in places far away from the location of the initial use of chemicals.

During the last fifty years attention to environmental problems has greatly reduced the risks of chemicals and of polluting technologies. But the challenges

we are facing now (for example climate change) are much more persistent and complex. Moreover, science and technology play an ever more important role in determining the risks and in leading the search for solutions. To address the types of questions we are facing now, technology, ecology and human society need to be analyzed together as complex adaptive systems<sup>6</sup>, in such a way that it leads to a *perspective for action*.

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<sup>6</sup> See for a discussion on complex adaptive systems, a.o. the special issue on complexity theory in the social sciences of the periodical *Theory, Culture and Society* (2005).



## Sustainable development and the behavior of people

Sustainable development can be viewed as a perspective for action if it positions people explicitly as actors. This way of viewing sustainable development deviates in certain respects from some other perspectives on sustainable development, but I view it as a necessary addition.

The sheer number of people in the world will cause development worldwide to be unsustainable, unless we manage to change the direction of development. But is it reasonable to expect solutions from people that generated the problems in the first place?<sup>7</sup> A reason for optimism is the fact that it has happened in the past, and that we have many resources at our hands, among which science, technology and creativity more generally. But: performance in the past is no guarantee for future results.<sup>8</sup> And the future of people is at stake.

That future is the central issue in the most authoritative definition of sustainable development, by the Brundlandt committee. The report 'Our Common Future' of 1987 described sustainable development as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (World Commission on Environment and Development (1987)).

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7 According to Einstein 'one cannot expect the same people that created the problems to generate the solutions'. I thank Jan Rotmans for this quote. West (1997, 2004) hypothesizes that in difficult situations a different type of person can start playing a role than in 'business as usual'-situations. He discusses Einstein and Churchill as examples.

8 Saris (2007) is of the opinion that science apparently generates an evolutionary advantage and that for that reason Western science spread quickly all over the World (p.67). It is true that the sciences have made important contributions to the situation as it has developed hitherto, but it is not inevitable that success from the past can be extrapolated to the future.

The Brundtland Committee, on the one hand emphasized the present and on the other hand future generations. The Brundtland perspective generates room for developing countries to generate economic growth. The perspective of the Brundtland Committee takes account of human needs as well as the environment (ecosystems) and economic aspects (profit). The perspective is often denoted as people, planet, profit.<sup>9</sup>

Sustainable development is a rather vague concept. A large number of definitions exist of the concept. It is also a contested concept, partly due to the large number of definitions and the practical contradictions that are generated that way (Roorda(2005)).

Using the triangle people-planet-profit(ability) does not define how the concept should be operationalized.<sup>10</sup> A large variety exists there. Often the triangle is being used as a framework for ordering aspects (see for instance Grosskurth and Rotmans (2005)). This is also what is being done in sustainability reporting of firms (often called: triple bottom line).

Much discussion has been generated about the question whether a strong or a weak interpretation of sustainability should be used. In the strong interpretation ecosystems hold a central position, whereas in the weak interpretation all three angles should be taken into account. Defenders of the strong interpretation often see the latter view as one in which 'profit' is central in the end. (Kallio et al. (2007)).<sup>11</sup>

As regards the triangle, most discussion is about the relative importance of planet and profit. A positive consequence is that over time a stronger connection has been developed between economics and environment. The possibilities of technological change have also become more into focus.<sup>12</sup>

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9 From the conference of Johannesburg in 2002 on, the term profit is often changed into profitability.

10 It is the type of conceptualization that Gigerenzer (2000) would call 'one word theory'.

11 Sometimes the words 'weak-strong' are used in a different way, namely 'strong' if none of the aspects may be impacted negatively and 'weak' when a comparative assessment is allowed.

12 An example of the latter is the factor-4 movement (e.g. Von Weissäcker et al. (1997)) and the Dutch programme Duurzame Technologie Ontwikkeling (DTO, Sustainable Technology Development): [www.dto-kov.nl](http://www.dto-kov.nl). Also the recent book by Lester Brown (Plan B 2.0 (2006)) belongs to this category.

But the third corner of the triangle, PEOPLE, has got appreciably less attention, whereas humans (with their culture and institutions) are key when it comes to considering sustainable development of human society.

The last few years have seen attempts to operationalize sustainable development also from the perspective of 'people'. But up till now the emphasis in those attempts is on the *limits* of what should be taken into account as regards sustainability. Reitan, for instance, poses 'surely no one would want to simply sustain the maximum number of humans organized into societies, knowing that that would mean survival at the barest, meanest, survival level.' (Reitan (2005)).

Marshall and Toffel (2005) choose a 'people' perspective by starting from Maslow's hierarchy of needs. In 1954 Maslow hypothesized that people only start fulfilling higher order needs when their basic needs have been fulfilled. He presented his view in the form of a pyramid with seven steps. Maslow's pyramid of needs has been criticized, amongst others because needs are not always fulfilled in the order Maslow suggested, and because the concrete items on the steps are culture dependent. In an adapted form, however, it is still in use.<sup>13</sup> Pinto, for instance, uses it to analyze cultural differences between groups: the self-actualization culture of Western people versus the honor culture of the East.<sup>14</sup>

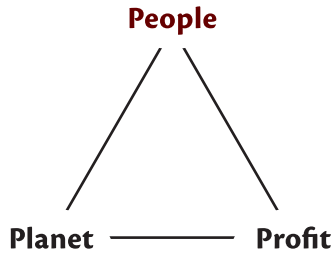
Marshall and Toffel consider reduction of shortages as regards the basic needs of human beings to be part of sustainable development, and quality of life and other values as *not* belonging to it. But, when we view sustainable development as an issue of the direction of human development, the role of people and their actions is crucial. If sustainable development is restricted to basic needs only, one views people literally as a passive object of sustainable development, as a stone to be carried by the earth.

It is important to view the process of sustainable development in relation to *activities* of human beings in general, and not restrict it to humans suffering from shortages. The revolutions throughout history that have led to the present dominance of humans on earth are due to human activities.

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<sup>13</sup> Marshall and Toffel use a version with four steps. 1. human survival at a basic level 2. health and life expectancy 3. extinction of species and human rights 4. quality of life and other values. See also: Goffman (2005).

<sup>14</sup> See: [http://www.davidpinto.nl/index.php?option=com\\_content&task=view&id=14&Itemid=42&lang=nl](http://www.davidpinto.nl/index.php?option=com_content&task=view&id=14&Itemid=42&lang=nl), approached October 2007.



**Figure 2**     *Triangle people-planet-profit(ability)*

Without (tamed) fire, agriculture, industry and communications technology, no seven billion people could survive on earth. We have to *engage* people, and not letting them be a dead weight, in our endeavors towards sustainable development.

For that reason, I use the following description of sustainable development.<sup>15</sup>

*A developmental direction is sustainable when people act to enhance the quality of their lives and to realize values important to them, by generating attractive possibilities within their competence, keeping into mind the developmental possibilities of future generations.*

In this description of sustainable development people are not just positioned as actors, but rather as *social* actors. During the last few years economists and psychologists have come close to each other in thinking about human decision processes.<sup>16</sup> There is widespread agreement that human behavior in

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<sup>15</sup> I do not use the term definition. I am not considering an all encompassing definition. Instead it is a precondition (and therefore an *additional* perspective) for sustainable development.

<sup>16</sup> Kahneman (2003), Gigerenzer (2000), Camerer et al. (2003), Smith (2003) all conclude that in most instances decisions are being taken quickly, without a conscious appraisal. In terms of Gigerenzer this is called 'fast and frugal'. A difference of opinion still exists about the question whether such a decision process should be seen as desirable, and, if so, when that is the case.



social situations strongly deviates from the behavior of the classical 'homo economicus' (or 'rational economic man' (Handgraaf<sup>17</sup>)).

It is also clear that in human decision making *emotions and interaction* play a clear role. This conclusion is reinforced by findings from neuroscience. Social rationality (sometimes also called ecological rationality) certainly gives a lead for a normative perspective as the quest for sustainable development entails. Viewing people as social actors also fits recent perspectives on social learning processes (Moser and Dilling (2007), Wals (2007), Goleman (2006)).

An important reflection for choosing social rationality as point of departure is the limited success of a more classical perspective to behavioral change. It has become abundantly clear that while *informing* people about an issue does lead to raising awareness. However, it is not enough for changing *behavior*. It is important to incorporate available knowledge on behavior and behavioral change in the quest for sustainable development. This has happened to only a limited degree up till now.

Another important issue is, that most agendas for sustainable development up till now have not been *attractive* or challenging enough for most people. Change becomes possible when there are large incentives. Regrettably, stimuli are often created by calamities. If we want to generate change without explicitly disastrous situations, we have to create challenges. Surely, stimuli can have their origin in envisioning possible *risks*, but incentives are greatly enhanced by identifying attractive *options*.

The tandem of risks and creating new opportunities (niches) is an important basis for transition management as it has been developed at Drift. I see transition management as an attractive actor perspective for sustainable development. Transition management provides opportunities for frontrunners, for persons with a new take on things and thinking out of the box, to contribute to new development routes. To speak with Moser and Dilling: the challenge is to create a climate for change (Moser and Dilling (2007)).

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17 Presentation at 'Sign of the Times', meeting organized by the Dutch National Science Foundation (NWO), September 16, 2007.



## Transition management

The hypothesis underlying the research agenda of Drift is that transitions are needed to realize a more sustainable society. Many social systems have persistent problems. Persistent problems are complex problems involving large uncertainties for which no direct solutions exist (Rotmans (2005)). According to Rotmans (2007) Dutch sectors having this type of problem are the energy sector, health care, water management and spatial planning.<sup>18</sup>

A transition is a fundamental change of the dominant structure, culture and mode of operation at the systems level. Structure is the institutional framework, the physical structure and the economic structure. Culture is understood as the shared images and values from which people think and act. And mode of operation are the actions, routines, rules and behavior. Posed differently, a transition is a fundamental change in thinking and acting at systems level, led by a desire to move to a more sustainable system (Rotmans (2007)).

The phase transition to a socio-ecological era I mentioned at the start can be seen as an example of a transition, and climate change is an important but not the only trigger in this regard. However, the worldwide changes that are needed for bringing about this particular transition are so overwhelming that it is impossible to address them directly and comprehensively. Drift therefore operates at smaller scale levels.

At Drift 'systems level' in practice is a sector or an area. Worldwide change is viewed as a slowly shifting background ('landscape'). The activities of the group address problems at a lower scale level. Activities at this level can, however, in its turn influence the landscape (see figure 3, multilevel).

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<sup>18</sup> Discussion of world wide transitions are presented by a.o. De Vries and Goudsblom (2002) and Speth (2004/5).

The most often used point of departure to address climate change is taking away its *causes* (mitigation). A crucial component of human impact on climate is energy use. For that reason climate policy is often energy policy. One attempts to reduce climate change by reducing the emissions of greenhouse gases. But, when one thinks about The Netherlands in connection to climate change there are, of course, also important and obvious *effects* of climate change, the most evident of which is on water management. The way water is managed will have to be adapted to the changing climate (adaptation). Therefore, two sectors where transitions are needed in The Netherlands are energy and water management.

What does a transition look like? At the start of a transition there must be an awareness that the existing situation is not sustainable, and the challenge is to work towards change. A basic assumption of transition management is that such changes begin on a small scale: such a beginning is called the predevelopment phase. Change initiatives are slowly getting more frequent and they may reach a larger scale ('take-off') till at a certain moment an acceleration occurs. After some time again stabilization sets in: the system has found a new dynamic equilibrium. (see figure 3, multiphase)

### **Water management**

The water management system in the Netherlands is very complex. The part of the Netherlands where we are now would not exist without a very complex system of dikes and drainage. That has not always been the case. In the early middle ages people could only live in The Netherlands when they retreated to higher parts of the country in times of high water, and by building houses on mounds, whether artificial or not. The shift from retreating to higher land towards building dikes is an example of an actual transition in the past. It was the origin of rather typical Dutch early modern democratic institutions, namely District Water Boards. About water management in The Netherlands fascinating stories can be told, and the Koninklijke Bibliotheek (Royal Library) in The Hague has a complete room devoted to Netherlands Waterland.

Revising Dutch water management principles has often been occasioned by calamities. As of the seventies of the last century rethinking began again, this time taking into account other interests besides safety. In the last phase of the Delta works the huge ecological consequences of the dikes in Zeeland became contested. That is why the Easterscheldt dam has been designed as

a half open dam, in order to safeguard more ecosystems. This was the start of a more integral way of looking at water management. Water management could no longer be considered as a technological project only, as other factors relating to e.g. ecology or the local economy have become more important. It is difficult to deal with such factors in desk studies only, as specific local situations have to be taken into account. As a general consequence, the interaction between water and spatial planning has become more and more important.

At the moment climate change has become an important factor in reconsidering once more water management. Sea levels are rising faster and higher because of climate change, and more and heavier storms are expected. The consequences for coastal protection are serious.

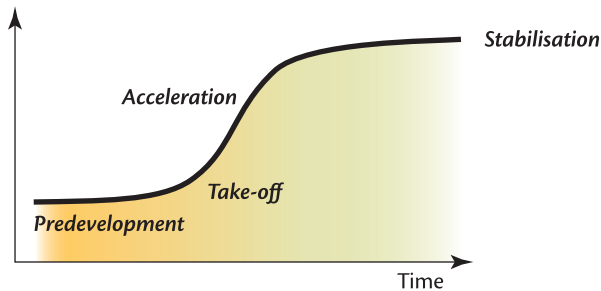
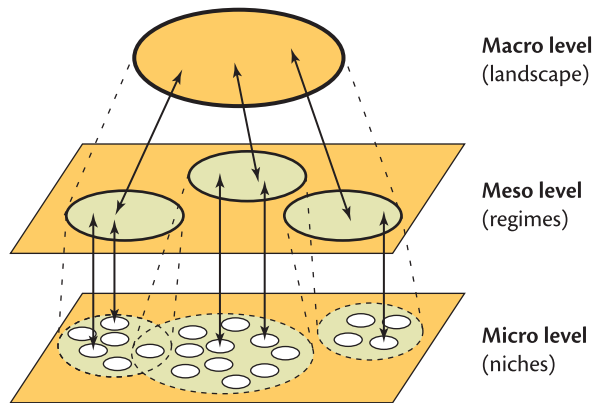
Also, rain will fall more irregularly in the future, but with greater intensity. The river Rhine may change into a rain river. These changes have consequences for river management: there will be periods when more water has to be accommodated, but equally periods of less and even too little water (e.g. for navigation).

Higher dikes will therefore no longer be the only answer. Solutions will involve at the very least to accommodate more water, but for this to be attractive, that is to create incentives for its implementation, we also need to generate options to live with water. The city of Rotterdam started such a move a few years ago.

Recently the Dutch government published a Green Paper entitled 'Vision on Water' that is intended to result in a national water plan in 2009. This vision explicitly starts from the necessity to arrive at a transition in water management, highlighted in five themes:

- Together the people from The Netherlands create a climate-proof Netherlands
- The people from The Netherlands live in a sustainable relationship with water
- The people from The Netherlands create a stronger economy with water
- The people from The Netherlands assist other countries and peoples all over the world with their water knowledge
- The people from The Netherlands rediscover living with water.

The question, of course, is how to achieve these goals.



**Figure 3** *Transitions are multi-phase and multi-level*

A transition perspective structures the complexity of a social situation in such a way that it stimulates active thinking about the change question. In cases like Parkstad Limburg<sup>19</sup> and in the energy transition (Loorbach (2007)) much energy was created among those involved. This helped to start a social and official change process.

In Dutch transition management the emphasis was till now mainly on creating arenas generating experimental niches. Creating arenas can be viewed as a form of niche management. These activities are directed at generating options (variations) that can play a role in a transition (selection).

<sup>19</sup> A former coal mining area in the South of the Netherlands.



**Figure 4** Commemoration sculpture Dresden

*The sculpture of a wave in Dresden in remembrance of the possible effects of high water levels in de river.*

In comparison to classical ways of option generation and assessment in the environmental area transition management strongly emphasizes the process character of the trajectory<sup>20</sup>. Compared to most research of governance, a.o. network governance, however, transition management is relatively content based. It is an approach in which content and process are being coupled (substantive governance).

Transition management in The Netherlands is still mainly focused on the early stages of the transition trajectory, though the experiences gathered in the last few years have resulted by now in some attention for next steps. One area concerns scaling up of transition experiments (Kemp and Van

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<sup>20</sup> This is of major importance, as it has been repeatedly shown that reporting is not enough to make an impact on policy (a.o. The Social Learning Group (2001), Joss and Bellucci (2002))

den Bosch (2006))<sup>21</sup>. But, for a change process to really acquire momentum the undercurrent should become a carrier wave (to use the terminology of Rotmans). Figure 4 shows the wave that was created in Dresden in order to commemorate how high water can affect a city.

An important mechanism to create a carrier wave is to raise the support of large fractions of the population, but this part of the trajectory has been the subject of few investigations so far.

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<sup>21</sup> It is becoming clear that the original ideal typical form of a transition as hypothesized by Rotmans is only one of the forms found historically (Geels and Schot (2007)).



## Sustainability management

What can I contribute to a more sustainable direction of our society along the lines I have laid out today? Evidently, I see transition management as an attractive perspective to support the aspiration of a more sustainable developmental direction. It is too early to be confident that the necessary changes will be attained by choosing such an approach, but there is no doubt in my mind that it will help us getting going. In that context it is attractive that such an approach enables the coupling of theory and practice (Flyvbjerg (2001/6)).

The transition approach is in a phase in which there are many challenging issues to be addressed. A number of them have been tackled already within Drift and KSI<sup>22</sup>. I will not attempt to give a complete agenda of relevant questions, but I make a selection of issue that will get specific attention in the frame of my chair.

One way of looking at transition management activities is that one is continuously working on a process of creating, assessing and managing options for systems change. Creating a transition arena, developing a transition agenda and designing and implementing transitioning experiments can all be seen as a sometimes explicit, sometimes more implicit ways of assessing and managing change into a more sustainable direction. In that process transition researchers play an important but in the end supportive, not leading, role.

When addressing complex systems in this way with sustainable development as the purpose, one can speak of sustainability assessment and management. In these cases the integrality of assessments is often emphasized (as is the case in the Matisse project for the European Union and the COOL-project<sup>23</sup>). From

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22 The 'Knowledge Network for System Innovations and Transitions', see [www.ksinetwork.nl](http://www.ksinetwork.nl)

23 COOL stands for Climate Options for the Long term (Van de Kerkhof (2004)).

a complexity framework, however, it is debatable whether it is always fruitful to strive after integrality. Focusing assessment on local circumstances can be an important factor to be successful.

Instead of integrality I tend therefore to stress the specificity of assessments. Specificity is in line with the maxim of the opening of the Academic year at this university in 2005: 'Think local, act global': look into what is locally important. Starting there one can draw lessons for elsewhere and the other way round (what can Dutch people, for instance, learn from Dresden).

I see it as an important task to develop the practice of these support processes and to reflect upon it. There is ample opportunity to do so within the context of the KSI-network. I also stress the importance of reflecting upon the normative questions arising from the roles of the transition researcher.

In taking this route I follow my general attitude. All my life my research has been motivated by the relationship between science and society. I always want to position my activities on that interface. My starting point is to move forward with one leg in practice and the other in research, in order that both activities can cross-fertilize. I believe in part time science in the sense of being a part-time hermit and a part-time practitioner. Sometimes it is not easy to keep the balance.

My practical activities will focus on supporting transition trajectories and forming networks that can lead to fruitful cooperation. On such transition trajectories sustainability experiments must be defined and implemented. I will also concentrate on developing a Knowledge Center Innovation and Sustainable Development between the three universities in the province of South Holland, as well as on further supporting the KISS network (Knowledge in Synergy for a Sustainable South Holland).

The importance of sustainable development, for instance in relationship to climate, is so huge that reflecting upon sustainability issues should be core in the approach towards education of this university. I intend to explore possibilities for this, and in what ways this could be developed and implemented.

## Research

My research agenda mainly originates in the ambition to support transition trajectories. Practicing transitions is important, but reflecting upon practice and developing the philosophy that characterizes and sustains the practice are equally important to support the practice.

### **a. Research of the practice of supporting transition trajectories**

Transition management is being deployed for complex, not easily definable problems surrounded by much uncertainty, and for which no direct solutions exist. The approach to be taken towards a solution is not immediately clear. In such a trajectory transition researchers play a variety of roles, with the primary objective of supporting the project and help realize an optimal course of the trajectory.

This type of process support, parallel to the trajectory, can be characterized as ‘Concurrent Sustainability Assessment and Management’. Here ‘concurrent’ has the dual meaning of ‘parallel’ to the process (Deuten et al. (1997)) as well as ‘supportive’. In comparison to what was the case a few decades ago, nowadays assessment practices are very interactive. As a result the roles of analysts/researchers conflate more with those of advisors or (partial) policy makers. This generates a number of research questions:

- What are the roles of transition researchers in transition trajectories
- How can one characterize the scientific practice evolving in those trajectories

- Which normative questions are implied by those roles

I am planning to focus this meta-analysis of the transition management practice on supporting and enhancing practice, and to investigate the effectiveness and legitimacy of those practices.<sup>24</sup>

### **b. Transitions on the way to the tipping point: phase transitions**

A number of transition trajectories that have been investigated during the last few years have now reached a stage in which larger groups from society should be engaged than frontrunners only. This is the case for the energy transition and the water transition. New questions require attention for the transition management approach to remain effective and legitimate.

When the issue is to involve broader groups, which entails the issue of democratic legitimacy, a start can be made by translating recent insights in social learning processes into their possible role in transition trajectories (social and emotional learning (Cosel-website: [www.cosel.org](http://www.cosel.org)), Moser and Dilling (2007), Wals (2007) ).

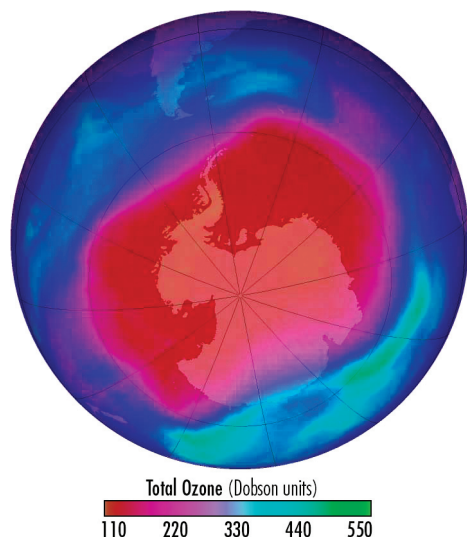
It is also important to gain more insight than is currently available in the conditions that have to be fulfilled to reach a tipping point. In the book 'Creating a Climate for Change', mentioned before, Kates identifies four such conditions in the foreword:

- changes in values/attitudes of the public
- imaginative pictures or happenings
- a structure of institutions and organizations that enables action, and
- practicable solutions.

Americans often use the example of the struggle for civil rights for Afro-Americans.

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<sup>24</sup> Comparable analyses have been made in the area of Technology Assessment, e.g. Interactive Technology Assessment, A guide (Grin et al. (1997), and Participatory Technology Assessment, European Perspectives (Joss and Bellucci (2002)). Wagenaar (2007) and Zouridis (2003) also discuss the role of social scientists in interactive practices. The practices described by them, however, differ in important respects from practices in transition management (see Loorbach (2007)).



**Figure 5**      *Ozone concentrations above the South pole*  
(source: NASA GSFC)

### **The example of stratospheric ozone depletion**

Another much used example is the ozone hole. Kates uses the example as an illustration of the above mentioned four conditions<sup>25</sup>. The history of the issue has been studied in the Social Learning project (Social Learning Group (2001)).

Scientific interest for the ozone concentration in the stratosphere led already in 1926 to a monitoring network. The first reason for societal attention

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25 P. xiv: 'Another example is the relatively quick international adoption and implementation of the Montreal Protocol on ozone protection. Strong global values and attitudes favoring the the protection of human and environmental health already existed and ozone depletion was directly linked to skin cancer. Response to the scientific discovery of the role played by chlorofluorocarbons (CFCs) in ozone depletion developed slowly until the identification of the ozone 'hole' provided a vivid image and metaphor. A broad set of health, environmental, and industry non-governmental organizations were able quickly to develop substitutes and to take advantage of a new regulatory environment that phased CFCs out of production.'

to stratospheric ozone was the fear in the 1970s that supersonic transport could possibly lead to ozone depletion. The attention soared steeply after the publication of an article by the later Nobel prize winners Rowland and Molina in *Nature* in 1974. But the actions of that period, amongst others concentrating around the use of chlorofluorocarbons (CFCs) in spray cans, did not lead to any practical political consequences.

It was only around 1985 that the development started to accelerate. The publication in *Nature* of the discovery of the hole played an important part in this. It can be stated that the negotiations leading to the Montreal protocol played an important role in linking the available knowledge to action. Actions taken were: the phasing out of CFCs, the introduction of alternatives and agreements to continue assessment and monitoring (Jäger et al. (2001)). From that time on a strong link continued to exist between knowledge development and policy.

Grundmann(2006) stresses that in the ozone depletion case The United States enabled the measures by showing leadership. He also states that in the case of climate change Germany tried to take up the same role, but not effectively enough. In my view he underrates in the ozone case the role of the possible alternatives for the hard CFCs that were becoming available, which strongly influenced the switch of Dupont as a CFC producer. He also underrates the fact that until recently the climate issue was not very vividly presented yet; therefore there were other factors involved besides the lack of leadership.

Different analyses tend to stress different factors needed to reach a tipping point. It is clear that all of the factors mentioned by Kates are important, but it is much less clear how exactly they interact to lead inevitably to a tipping point.

### **Towards a water transition?**

If we apply these conditions to the *water transition* in the Netherlands there is cause for optimism and for pessimism. Many water related issues are debated in the media, but attention does not automatically lead to a shift in attitude. The lively pictures that people have in mind when they think of water in many cases rather strengthen the tendency to hide behind dikes instead of inviting them to think of providing more space to water, or of the creative possibilities water can inspire in us in this country abounding in water. Searching for



**Figure 6**     *An outlook in the Biesbosch*

pictures we can learn from elsewhere, like Dresden. We can also look at those areas where historically the link with water has always been prominent. An example of the latter is the Biesbosch, which Dutch people naturally associate with water, much water. This is an area where water storage is seen as a natural function, because it fits into pictures we remember, like the one by me as a hiker (figure 6).

The 'Vision on Water', mentioned before, sets the first steps in this direction, for instance by creating a water canon. However, one can question whether the structure of the various institutions dealing with water in The Netherlands is suited to generate the necessary action. In its annual report 2006 the Rathenau Institute states that for example the research institutes relating to water problems still don't look very much across boundaries between disciplines, and make too little use of practical local knowledge (Rathenau Institute (2006)).





## Conclusion

I conclude that quite some effort is still needed to realize a transition. For the coming years I plan to study the practice of societal transitions and to reflect on the process. At first sight my activities therefore bear a resemblance to my PhD research on phase transitions in solids (perovskites). But the underlying questions now are many times more complex.

By now it must be clear that I am convinced that we must involve people in the quest for a more sustainable direction of our societal development. Not only will our society not become more sustainable without people behaving in more sustainable ways and creating more sustainable institutions, I also think that devoting oneself to such a cause can be a way to overcome the unbearable lightness of being.

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My children Simon and Arthur (and of course Maryam) I am grateful to for the material and immaterial contributions to my joy in life and to self-reflection. Simon, amongst others, I thank for the picture of Dresden. And Arthur because of his reflection on my first inaugural address (he was nine years old at the time): “It was like a presentation at school, but not a very good one, because you *read* it from paper”.



*Figure 7* Card box found in my parent's house

And finally, I indirectly wish to thank my parents. When I was clearing their house last spring I found a card box carrying the following maxim:

*Life ain't holding the good cards, it is playing a bad hand well.*

That is certainly true.

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