The Winners of the Blue Planet Prize

2000

2000

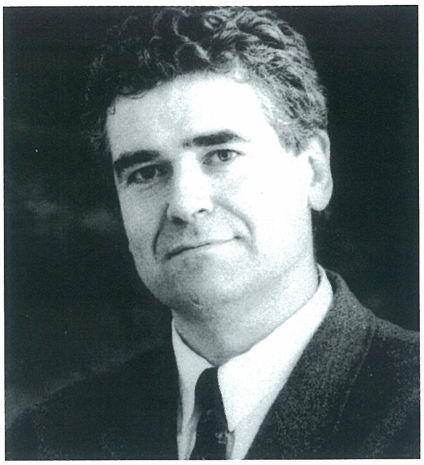
Blue Planet Prize

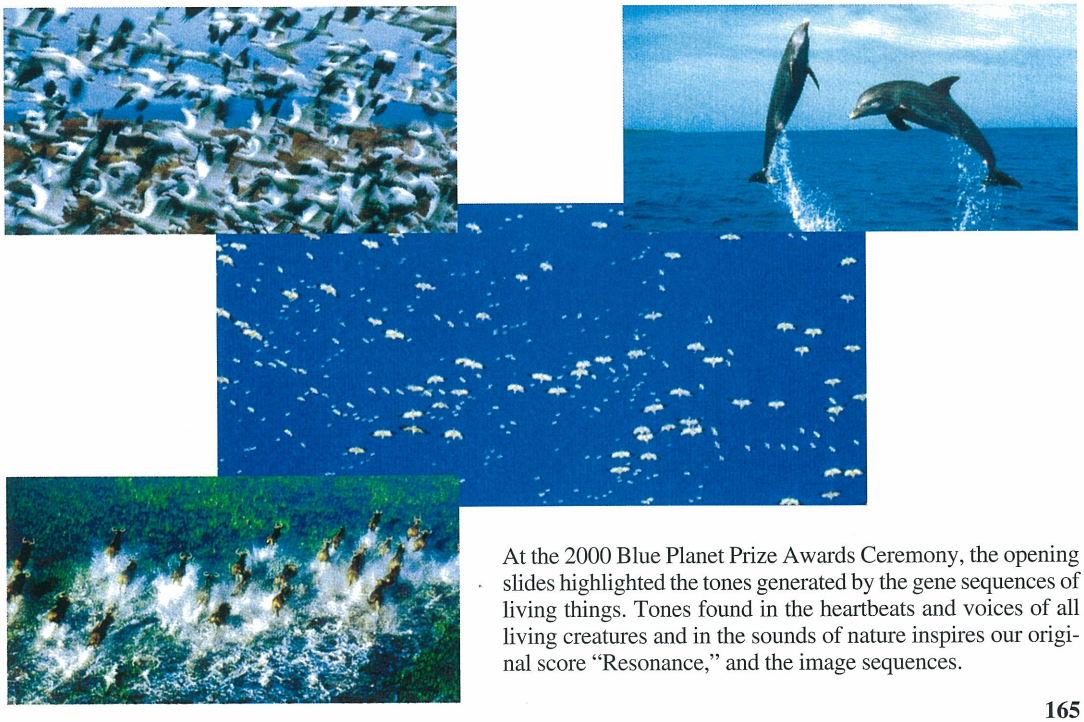
Dr. Theo Colborn (U.S.A.)

Senior Scientist and Director, Wildlife and Contaminants Program, World Wildlife Fund

Dr. Karl-Henrik Robèrt (Sweden)

Chairman of The Natural Step (NGO)





At the 2000 Blue Planet Prize Awards Ceremony, the opening slides highlighted the tones generated by the gene sequences of living things. Tones found in the heartbeats and voices of all living creatures and in the sounds of nature inspires our original score "Resonance," and the image sequences.

His Imperial Highness Prince Akishino congratulates the laureates.

Hiromichi Seya, chairman of the Foundation, delivers the opening address.

The prizewinners receive their trophies and certificates of merit from Chairman Seya.
Upper: Dr. Theo Colborn
Lower: Dr. Karl-Henrik Robèrt

Thomas S. Foley, Ambassador of the United States to Japan (left), and Krister Kumlin, Ambassador of Sweden to Japan (right), congratulate the laureates.

Prior to the awards ceremony, the award recipients meet the press. From right: Dr. Robèrt; Dr. Colborn; Chairman Seya; and Kimihiko Sato, senior executive director of the Foundation.

The Blue Planet Prize Commemorative Lectures.

Profile

Dr. Karl-Henrik Robèrt

Chairman of The Natural Step (NGO)

Education and Academic and Professional Activities

1947	Born in October in Sweden.
1975	Medical license, Karolinska Institute.
1979	Ph.D., Medicine, Karolinska Institute.
1984	Swedish Hematological Association Research Award.
1985-1993	Division Head, Clinical Hematology and Oncology, Department of Medicine, Huddinge Hospital.
1987-1993	Chief Editor, Reviews in Oncology.
1989	Founded The Natural Step (NGO).
1991	Best Social Invention, Institute for Social Inventions, London, England.
1994	Stockholm City Council Prize.
1995	Professor of Resources Theory, University of Gothenburg.
1996	Swedish Forestry Association Prize.
1999	Green Cross Millennium Award for International Environmental Leadership.

Feeling an impending sense of doom about the degradation of the environment, Dr. Robèrt thought that to avoid further ravaging the environment it would be necessary to follow natural cycles and create a society in which resources were consumed within the scope of nature's processing ability. In short, he believed that we had to develop a sustainable society. Based on discussions with prominent Swedish scientists, he derived the following four systems conditions that would serve as the principles of a sustainable society.

In a sustainable society, nature is not subject to systematically increasing:

1) concentrations of substances extracted from the Earth's crust,
2) concentrations of substances produced by society,
3) physical degradation,

And, in that society:

4) human needs are met worldwide.

Then, based on these conditions, he created a new framework for corporations to determine the steps that they should take to help realize a sustainable society.

In 1989, Dr. Robèrt set up "The Natural Step" NGO in Sweden. This organization provides corporate management and policy makers with the decision-making standards and methodologies to formulate plans from a sustainable perspective. The organization is a collection of entities bound by these concepts and has won the approval of numerous companies and government bodies that are putting this thinking into action.

The advanced activities in this field of Dr. Robèrt's native land, Sweden, are serving as a model for the rest of the world. To date, The Natural Step activities have already spread to eight countries.

Essay

The Second Arena

Dr. Karl-Henrik Robèrt

May 2001

The objective of The Natural Step (TNS) is to create more solid platforms for decision-making through systems thinking. A dialogue between scientists and decision-makers in business and science—ongoing since 1988—has created The Natural Step Framework. The Framework, with its "funnel," the system conditions at its opening, the self-benefit in avoiding its walls, and the methodology to strive to compliance with the system conditions while improving bottom-line business, is described elsewhere in this book. The Natural Step Framework, created to further a more constructive dialogue and provide a basis for strategic decisions, has changed many firms and municipalities around the world.

But change doesn't only occur as a consequence of everybody taking part in a conscious dialogue. It is fine when that happens, but it would be a mistake to underestimate the importance of the small changes that occur as a consequence of much more subtle influences, a combination of direct and indirect spin-offs from the big and visible events. It is billions of communications in a web of interacting questions and answers that eventually lead to cultural change—like a slowly growing breeze that eventually fills a sail. I am proud to say that TNS has played a devoted and passionate role to fill that sail through the education of hundreds of thousands of decision-makers about the funnel, the self-benefit in avoiding its walls and the rationale behind our framework. Our impact is far greater than the relatively few firms and organizations that apply our framework as intended. The really systematic firms can merely be regarded as "laboratories" in which it has been demonstrated that it actually works, and as "locomotives" at the leading edge of societal change. And through their influence and guidance, the changing wind has become so much stronger than it would have been without their presence, through all the indirect effects.

But I am aware that we cannot just sit and wait for a slowly growing number of firms that apply a sustainability perspective to their work, and for the others to continue with their *ad hoc* programs even if they get somewhat more radical. Working *ad hoc* has been the most typical way during the 90s in general, and we can call that to be active in "Arena 1." Whereas, the few systematic "laboratories and locomotives" that apply backcasting from a sustainability perspective—firms like Sånga Säby Conference Hotel, Scandic, Swedish McDonalds, Interface, Collins Pine, Patagonia, Body Shop and a few more—are in Arena 2.

From a business perspective, the two arenas can be characterized as:

Arena 1 = Lantern-Navigation

- Ethics, market, profitability
- Head of environment
- Environmental management system (EMS)
- "Eco-efficiency"
- Indicators/key-figures

In Arena 1, firms have realized that it will be necessary from an ethical point of view to take sustainable development seriously. Profitability will gain from this in the long run, partly due to the ethical reasons, partly because of higher "eco-efficiency" —waste is money. To that end, firms in Arena 1 have selected a head of environment and an environmental performance system. To demonstrate the seriousness of all this, they run a number of projects *ad hoc*. And they have a number of indicators and key figures to monitor progress for these *ad hoc* projects. Those projects and indicators are selected in terms of what the market likes or wants right now, and in terms of what legislators are likely to say soon. This is like orienting on the lanterns of other boats in an archipelago full of rocks, and will not be sufficient in the long run.

Arena 2 = Lighthouse Navigation

- Systems perspective
- Social, ecological, economical sustainability
- Course-corrective investments
- Head of environment in management team
- EMS is business-strategic tool

In Arena 2, firms have realized that it will be necessary to have a sustainability perspective for planning. These companies generally talk more about social, ecological and economical sustainability, than about the "environment." Profitability will rise only if objectives and strategies are planned with a backcasting perspective from principles that are robust enough to cover ecological and social sustainability. In those companies, the head of the environment is part of, or closely allied with, the management team. The EMS is a business-strategic tool, not a dust-collector on the book shelf of a frustrated "Head of Environment." This is like orienting from fixed lighthouses, and the risks of hitting rocks further ahead are highly reduced.

In the new millennium, we need a new awakening of society at large, much in the same way as when Rachel Carson wrote her book. But the problem is that this time the sense of urgency is much less than it was then. Firms were then caught off-guard, birds were dying, and they didn't know what to do about it. Today, many Arena 1 firms believe that they are in control just because they have a "green" manager and an environmental management system. However, there are probably few professional groups in society today that are more frustrated than green managers at large companies. They are rushing around screwing on filters and asking for higher budgets, whereas the dynamic top management team is running business more or less as usual. If the CEO is asked—for instance by journalists—reference is made to this

poor chap, who sits there in his green office with his EMS that nobody reads. I am not certain what will be needed to make the majority of firms want to break up with Arena 1 and make it to Arena 2. But I hope that we won't have to wait for more and more powerful build-ups of natural catastrophes to make it happen.

A somewhat paradoxical perspective may actually be the rescuer here. I think that social sustainability (system condition 4) may hold the key to our salvation. To be a contributor to the violation of that system condition will cause very serious backlash effects just like for the first three system conditions, and it is as bad a business idea in our funnel as anything ecologically linked to non-sustainability. However, most firms have not reflected on social non-sustainability, or how they are active parts of the problem in this aspect. This means that today's non-sustainable social make-up of modern society holds a potential for a "big bang" awakening—just like when Rachel Carson raised the first awareness of ecological non-sustainability. If the green movement plays its cards well, social sustainability may become the vehicle for a new dawning of urgency that may bring the whole sustainability perspective into focus. In fact, it is difficult to even perceive a successful cultural change, built on visions of an attractive sustainable society, without a deeper and systematic view also on ecological sustainability.

The protests against the World Trade Organization (WTO) in Seattle in Fall 1999 is an example of a possible dawning of a more powerful social awareness on the global scene. When I was invited to the Year 2000 World Economic Forum, I got further evidence that social responsibility is likely to build momentum.

World Economic Forum, Davos, February 2000

I have many impressions and thoughts from this meeting, but I will restrict myself to two that can exemplify the differences in awareness of ecological and social non-sustainability, respectively.

The Greenhouse Effect

A positive surprise was that scientific knowledge about global climate change seems to have finally reached decision-makers. It was commented on over again, and I didn't see one single example of an effort to sweep the issue under the carpet. A questionnaire amongst the delegates showed that a clear majority was of the opinion that the greenhouse effect deserves stronger political measures. The nebulous attitude that characterized mass-media discussions of global warming during the last years wasn't present. The general message was that we must cut down on the global use of fossil fuels by much more than half in a few decades in order to avoid increasing risks. This, of course, means even greater reductions in the industrialized part of the world.

During one of the seminars, the international head of Greenpeace, Tilo Bode, and the chairman of Shell, Mark Mudy Stewart, reached consensus on the need for significant reductions in fossil-fuel combustion. They also reached consensus that the road to success lies in a sped-up transition to other fuels, and that the only economically possible way is reduction in overall fuel use: in other words various means of improved resource efficiency.

Global Social Inequity

Down the road from the Congress Hall, activists were smashing windows at the local McDonald's. President Clinton, in his address, spent considerable time on the growing gaps in the world, and warned that it would be a great mistake not to take protest activities of this kind seriously.

According to Clinton, the Davos meeting ought to sketch out attractive future scenarios where the gaps *have been* bridged, where programs for the transition ought to be designed to take us there (backcasting). The trustworthiness of the politicians when it comes to shaping such visions was, according to Clinton, limited. In other words, Clinton asked for help.

Perhaps we can look forward to more politicians realizing that the growing gaps between rich and poor are untenable and a threat to all. Isn't it even likely that this will be the case, in consideration of today's worrying trends?

- More and more people spend time on investing in shares on the stock market without having a clear idea in what way this is beneficial to society. Larger and larger sums of money are turning over in shorter timeframes. The short-term profits are generally without any linkage to human services or value-added. We are drifting further and further away from what work and being economical are all about. In short, money has taken on a life of its own.
- Heads of business, when asked on TV about their ambitions, are eager to testify that they are "serious" and trustworthy. In the terminology of the 90s, this has begun to mean that they *only* think about profit and shareholders. Almost nobody dares any longer to claim that he or she has more ambitions with his or her firm than earning money—no agendas for any other purpose. Almost without us noticing, money has changed position from being a means for society to become the goal itself; the only goal.
- Money is allocated to the sectors of society where the opportunities for growth and profit are largest. At the same time, schools and medical care are being deprived of resources. Who expects the teaching of kids and treatment of patients to grow in competition with the Internet? But isn't care for children and the infirm and the elderly the major sign of a culture?
- If, from time immemorial, cultures have been held together by "living stories of meaning," what is the story of our times? That everyone should take care of him- or herself? That economical growth is the tide that sooner or later will lift all boats—also the poor ones? We live in a world where we can phone anybody anywhere in a few seconds. Is it then reasonable to envision a rich and happy world—fenced in and surrounded by even more starving people than today's one billion of them, who do not even have access to safe drinking water or enough food? Is it even theoretically possible to expect this development to be possible?

The question now is not only a moral one, it is also an issue of common sense. Today, the rich part of the world seems to be more focused on consumption than on worthy global visions. If

that trend should be allowed to continue, we will fail to develop the wherewithal and institutions that are needed for the inclusion of the developing world into meaningful and secure prosperity. Is it possible that only the poor part of the world will be affected if we fail?

The TNS "funnel" denotes that the room for maneuver is diminishing due to non-sustainability. "Degrees of freedom" are systematically diminishing due to reduced productivity in ecosystems while demands on living systems increase. It is not difficult to imagine how the walls of this funnel will constrain those firms that are relatively responsible for creating the narrowing: green taxes, waste management costs, insurance costs, increased liabilities, et cetra. But in what way are social matters part of the funnel, and how will socially non-sustainable activities affect the individual firm? It is easy to foresee a series of events that could cascade into second- and third-order effects in a self-perpetual loop:

1. **Anxiety and tension.** The rich part of the world becomes less secure. A few examples:
   (i) Loss of culture and alienation. The graffiti seen on underground cars: "You destroy our future, we destroy your present." Children have even started to kill each other. Money, instead of a living culture, is a bad substitute. Certainly there is reason to start seeing a connection?
   (ii) We violate our conscience and sense of self since we are violating the golden rule: "what you do not want others to do to you, you shouldn't do to them." We are, for instance, using more fossil fuels per capita than we would like Chinese people to do, and we buy resources from poor countries at such low prices that social costs are not paid for. Many people feel an increasing uneasiness and would probably be prepared for action if they only knew what to do.
   (iii) The costs—for instance of the United Nations—to deal with conflicts about water, small eruptions of violence, ecological refugees and famine catastrophes are increasing year after year.
   (iv) Many environmental consequences of poverty are already hitting the rich world indirectly. Examples include deforestation contributing to around 20% of the greenhouse effect and the loss of biological diversity and thereby future resources.
   (v) Worries have already started to influence "the market." Examples are companies that have been stigmatized due to internationally inequitable behavior. Shell's exploitation of poor people in Nigeria, for instance, is but one example that cost this company billions.

2. These worries, that of course have many more mechanisms than the ones discussed above, are causing the channeling of more money along new pathways in the market. Examples are:
   (i) Thirteen percent of funds in the United States were reported ethically invested at the Davos meeting in 2000. Although there is not much discussion yet, this means money is being withdrawn from one sector, industry or company, and being placed into another. Isn't it likely that this trend will continue as long as the walls of the funnel continue to lean inward?

(ii) Certain private funds are allocated directly to certain projects in the developing world. For instance, Bill Gates has donated billions of U.S. dollars to vaccination programs for the poor.

(iii) Certain firms have started to launch projects in poor regions of the developing world. Shell, for instance, has recently started installing solar photovoltaics in South African townships using so-called "smart cards" costing residents no more than a month's worth of kerosene.

3. The more good examples we get on the list above under Point 2, the easier it will be for proactive politicians to start acting. This is probably what Clinton meant when he asked for help in Davos. In a democracy, politicians have difficulties to take the lead setting goals in the beginning of a paradigm shift. For example, politicians cannot implement heavy taxes on fossil fuels until the alternative fuels exist on the market. A changing policy generally starts as a dialogue between proactive people and proactive firms. New political means, laws, money for welfare projects and institutions for social justice will only be feasible to implement when there is a growing political "market" for it. Then, good cycles will drive development much faster. It will be easier to put more good examples on the list above and then it will be even easier to speed up the political development.

For those firms and institutions that are today trying to hide behind the idea that it is far away to the have-nots, and that there is nothing that can be done anyway, there is a growing risk that the thinking will backfire. For those who want a brick wall between poor and rich, there is all the reason to contemplate another brick wall in our history, the Berlin Wall. The breaking down came with such surprising rapidity that all the defenders of the wall could not catch up.

The next Davos meeting in 2001 had a new overriding theme: "Bridging the Gap." Clinton actually opened the way. Cultural change might eventually occur, fostered by the only "living story of meaning" I can think of at this point—the vision of an attractive sustainable society. A "Taking Care of the Planet Culture." As far as I can understand, it's not even feasible that ecological sustainability would be left out. It is my hope that we have just seen the dawning of it, and that the relative lack of social awareness of the green movement—that goes for The Natural Step too—is the reason why we have had to wait so long.

Lecture

Planning from Principles for Success

— Lecture on The Natural Step Framework —

Dr. Karl-Henrik Robèrt

A Framework for Strategic Planning

During its evolution, nature has slowly grown cleaner as a result of the workings of life. Plants have concentrated and organized matter on earth through the process of photosynthesis. This has enabled the development of ever more sophisticated life-forms, in an almost inconceivable complexity and diversity. With the appearance of animals, biodiversity registered another increase—with a parallel increase for plants. Because of their ability to move, animals distributed organic waste that plants could use. Animals also helped plants with pollination. In other words, nature evolved.

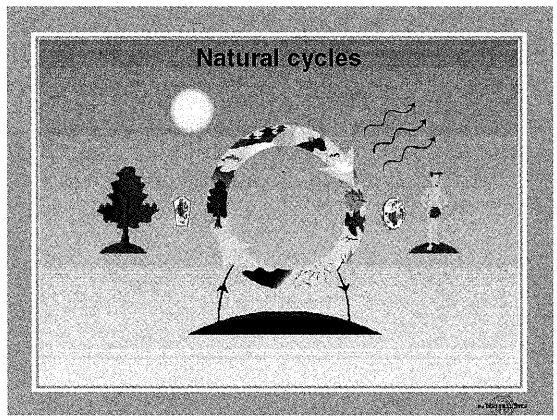


Figure 1. The human and natural cycles.

Sustainability and sustainable development only became important once people were affecting nature so that society's co-evolution with nature was no longer sustainable. Nature is complex. So is a description of all the environmental problems that follow from society's current non-sustainable course...

Environmental damage is not usually caused by a small number of 'hotspots,' but rather, from a host of diffuse sources. All serious environmental problems cannot simply be blamed on manufacturers and factories. Some causes have more to do with our behavior—the goods and services we consume, and the transportation we use. Besides, the effects of environmental damage are rarely direct. There is often a deferred effect. Once ecotoxins have been applied

in the production of our goods, it often takes a long time for them to be released. Nowadays, most people are aware of a great complexity in environmental problems. Many problems are now global rather than regional and it is difficult to find direct instances of cause and effect. This is the underlying reason for all the endless debate between scientists that we see and hear every day in the mass media.

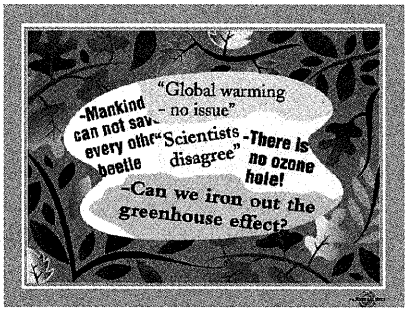


Figure 2. Newspaper clips.

Often, different environmental problems have a knock-on effect. Acid rain speeds up the leaching out of metals from the soil to waters, which, in turn, causes toxic effects in the ecosystems. As a rule, it's not possible to recognize today's environmental problems using our own senses. It's even more difficult to predict tomorrow's environmental problems lying dormant in the system. With this knowledge it is obvious that we need a *framework* to be able to handle complicated environmental problems.

The Natural Step

I'm a medical doctor and a cancer scientist. Through insights from working with cells, I launched a consensus-building process amongst some of Sweden's top scientists. The objective was to come to grips with the confusion that came from all the complexity of the environmental problems that were caused by our non-sustainable society. To turn everything upside down in relation to the fascination over disagreement and polarities, I asked, "What can we agree on?" Impelled by an understanding of the value of establishing basic fundamental principles for the structuring of data in order to make better sense for decision-making, my colleagues merged forces to do their best. Imagining that if a society could share the same understanding of how a sustainable society could interact with the cycles of nature and thereby share the same principles for sustainability, then it could take on the challenge of sustainable development in a strategic way. The scientific consensus process yielded several benefits that continue to serve as societal drivers towards sustainability. The most touted is the first consensus document, which roughly outlines the way in which the cycles of nature work, how they are being disturbed, and that society—not least the individuals who are part of the problems rather than the solutions—will eventually pay prices for this economically, socially and ecologically.

Equipped with this quite unique document, I began to recruit the necessary players in

order to spread the news to a slightly larger audience—the entire Swedish population. Momentum was created in a step-by-step process, recruiting more scientists, then entertainers, then Swedish television, the government and eventually the Swedish King. This was enough for the sponsors to hop on board. As a result, a thirty-seven-page booklet emblazoned with Det Naturliga Steget (The Natural Step) and an audiocassette was mailed to every household in Sweden, 4.3 million copies, and thus the organization, The Natural Step (TNS), was born in April 1989.

The Natural Step and The Natural Step Framework

Various activities that sought new and strategic social engagement and public education sprang up due to motivated individuals: the Environmental and Challenger trains (mobile educational and marketing trains that covered the country), the King's Challenge (a tetra-annual competition for the best eco-municipality), the Youth Parliament for the Environment (an annual TV broadcast event that engages around 50,000 students), and more and more municipalities (soon the majority of them) that adopted The Natural Step Framework as their planning platform for their Agenda 21 work. Another outcome, partly due to aspects of Sweden's cultural character, was the number of self-organized professional networks for the environment. These groups ranged in size from thirty to hundreds of people, and represented most major professions: scientists, engineers, doctors, nurses, et cetera. Academia, industry and informed actors produced a series of consensus documents, which outline an agreed-upon vision of the sustainable future of that sector.

The Natural Step Framework

The Natural Step Framework is a methodology based on planning from a 'future sustainable perspective,' known as backcasting. Backcasting is a method of looking back from an imagined point of time in the future. To begin with, we envisage a successful result in the future. Then, we ask: "What can we do today to reach this goal?"

Planning with backcasting is especially effective if there is a high level of complexity, a pressing need for fundamental change and when dominant trends are part of the problem. As all three of these are currently very much in evidence, backcasting plays a useful role in planning for a sustainable future.

Nobody can look into the future, so it cannot be described at the detailed level. But at the principle level, we can *define* it! Backcasting must occur from *basic principles*, or *conditions* that need to be in place in *any* sustainable society. This is much like playing chess. It is backcasting from the principles of checkmate that provides the strategic framework of the game. The major achievement of The Natural Step is that we developed such a framework, which includes such basic principles for social and ecological sustainability, named "System Conditions." In this context, backcasting means planning from a "future sustainability perspective" by asking the following question: "What shall we do today to increase our chances to comply with the System Conditions tomorrow?"

The Natural Step works with organizations that want to become good examples and role models—firms, municipalities and other organizations—asking themselves this question. We

coach them *strategically* so that their programs for social and ecological responsibility will pay off also economically. To that end, organizations are trained to use The Natural Step Framework, which means to apply a sustainability perspective to planning, and then to move systematically and strategically in the right direction. With the help of a sustainability perspective, many organizations have been able to avoid the problem of "rushing after reality," and "fixing" problems from principally non-sustainable planning. Thereby, they can successfully reduce costs, improve quality and identify new customers and markets.

The Natural Step Framework is a planning methodology with the following components:

The Funnel: Reflects society's diminishing room for manoeuvre. The long-term prospects of organizations will improve if operations are steered in a sustainable direction, toward the opening of the Funnel.

The System Conditions: First-order principles that define a sustainable society (at the opening of the funnel).

Strategy for Action: A four-step program where backcasting is used in a way that helps organizations to move toward sustainability while at the same time maximizing financial returns.

Below follows a comprehensive description of these components.

The Funnel

Life-sustaining natural resources are subject to increasing deterioration from human activity. Species extinction is gathering pace. Productivity of forests, agricultural land and fisheries are declining. To harvest or catch as much as we did last year, we have to put in more resources—to obtain the same amounts of food, wood and other raw materials, we need bigger fishing boats, more energy, more pesticides and more fertilizers.

The reason for this reduction in productive potential is that we are polluting and displacing nature in various ways. Renewable resources are being used up at such a rate that nature does not have time to build new ones. In the same time, we get more people on earth and the gap between rich and poor is widening. It's as if civilization is moving into a funnel whose narrowing walls demonstrate that, in the quest for good health, welfare and economics, there is less and less 'room for manoeuvre.'

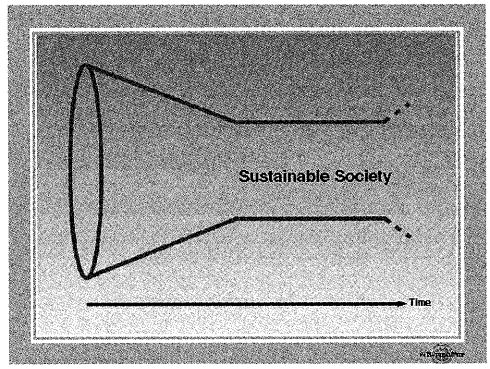


Figure 3. The funnel.

There is a potential self-benefit in being part of the solution rather than the problem. While sudden economic setbacks may be viewed as 'bad luck,' they are usually caused by earlier investments in techniques or activities that go against the conditions for a sustainable society. Though certain companies can still earn money from not taking part in our shared responsibility for the world we live in, the statistical chance of avoiding the consequences decrease over time. A new way of planning must be put in place to avoid problems such as:

- higher raw materials costs,
- higher energy costs,
- harsher environmental legislation,
- differentiated taxation,
- rising insurance premiums,
- lower credit ratings,
- criticism in the media,
- eroded public confidence,
- loss of environmentally aware customers,
- recruitment problems and difficulties in retaining quality staff.

Although long-term financial results will improve if operations are steered in a more sustainable direction, they also need to be profitable even in the short term. How short term and long term can be merged into a strategic program is described under the two following aspects of The Natural Step Framework.

The System Conditions

To be able to handle the complexity of environmental problems, we must move from assessing impacts in nature from human actions to finding the root-causes for these effects.

Can we sum up the root-causes for non-sustainability? There are essentially only three mechanisms by which human society can damage nature.

- Nature is damaged if concentrations of substances that are extracted from the Earth's crust are continually rising because they are dispersed in nature faster than they are returned (re-deposited in the Earth's crust).
- Nature is damaged if concentrations of substances produced by society are continually rising because society disperses them faster than they can be broken down and built into new resources by nature (or deposited in the Earth's crust).
- Nature is damaged if it is continuously degraded by physical means. This occurs either by extracting more than nature can build up again (for instance, more timber or fish than can be regenerated) or by other forms of ecosystem manipulation (for instance, altering the water table, soil erosion, unforeseen accidents with genetic manipulation, over-harvesting or covering fertile land with asphalt).

By looking at these three ways of damaging nature, and then adding the word 'not' to all of them, The Natural Step has defined the three first-order principles that establish the framework for a sustainable society. A sustainable society is characterized by the fact that it is good at satisfying human needs, but *within* this framework. The fourth fundamental principle takes into account the ability of a sustainable society to satisfy human needs everywhere.

The Four System Conditions

In the sustainable society, nature is not subject to systematically increasing...

1....concentrations of substances extracted from the Earth's crust

2....concentrations of substances produced by society

3....degradation by physical means

and, in that society...

4....human needs are met worldwide.

These four basic principles, known as the four System Conditions, make up a framework defining the prevailing conditions that will apply in any sustainable society.

In the illustration below, the four System Conditions are shown in relation to natural cycles and human society as an integrated system where flows are balanced and "left over matter" does not increase in concentration in nature.

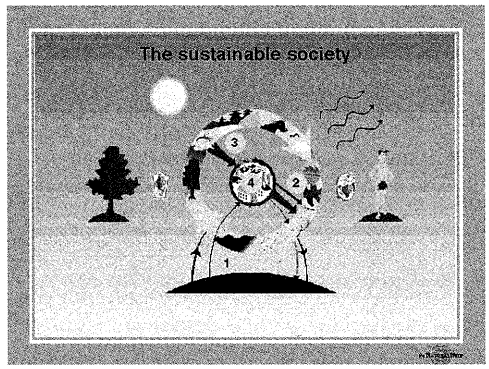


Figure 4. The sustainable society: natural cycles (the larger circle) surround society and define the limits which we have to live within. In a sustainable society, plants (on the left-hand side) build up enough renewable resources to satisfy consumption by animals and humans (on the right-hand side). Various agents break down the waste from animals, thus making it available, as a resource, to plants. The sun provides energy, and heat radiates into the universe. Society lives partly on small flows of metals and minerals from the earth's crust (1) and on larger flows from nature's production (3). A flow of substances produced in society leak into nature, but no faster than they can be broken down or assimilated in the natural cycles (2). In this society, resources are recycled and used efficiently so that human needs can be fulfilled effectively (4).

Strategy for Action

Firms that are applying The Natural Step Framework, structure the work in the following way:

A *Sharing The Natural Step Framework*

Discuss the Funnel, and the System Conditions, and the ***A,B,C,D***-analysis that is presented below, among all participants who are going to be part of developing the program for transition. It is important that critical questions are allowed, so that the team eventually has a clear picture of how much they share on the principle level. This refers to the strategic competence to move in the direction of social and ecological sustainability, and the economical self-benefit that lies in doing so.

Firms that have done this, generally define their overall objectives in the following way:
Our ultimate sustainability objectives are to:

1. *...eliminate our contribution to systematic increases in concentrations of substances from the Earth's crust.*
2. *...eliminate our contribution to systematic increases in concentrations of substances produced by society.*
3. *...eliminate our contribution to the physical degradation of nature through overharvesting, introductions and other forms of modification.*
4. *...contribute as much as we can to the meeting of human needs in our society and worldwide, over and above all the substitution and dematerialization measures taken in meeting the first three objectives.*

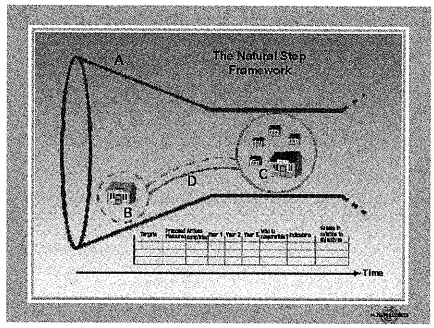


Figure 5. The Natural Step Framework.

B *How Does the Organization Look Today?*

To find out how our organization is impacting the environment, we need to carry out an environmental review (see B in *Fig 5*). This review will provide the foundation for specific environmental targets and planning. The environmental review should map out such flows and practices in the organization that are critical from a sustainability perspective— with regard to the *ultimate sustainability objectives* of the organization (see above).

An organization is like a box with various flows going into, or coming out of it (see *Fig 6*). If these flows are analyzed in relation to the System Conditions, we end up with a list of problems, or environmental aspects, that have a sustainability perspective (not only a "today's impact perspective,"— such effects in nature or society—occurring from violation of the system conditions—that we are already familiar with). We already know that nothing disappears, so it seems logical to start by looking at the flows of raw materials and energy being imported into 'the box'. That way, we can eventually relate these to what is being exported.

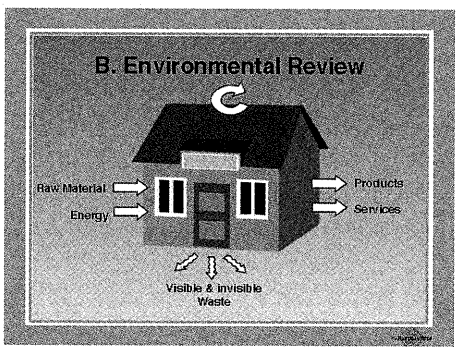


Figure 6. Environmental review.

It's important to involve all employees, as everyone has some impact on the flows of raw materials and energy. Whoever is responsible for a particular task or process should know what flows arise out of that process. To achieve this, the same individual must be drawn into the process of identifying problems and developing specific measures, and then be responsible for the implementation of those measures. At The Natural Step we have found the best results are obtained if employees themselves carry out the environmental review – backed up by resources, such as questionnaires, that examine the position of the organization in relation to its ultimate sustainability objectives.

Sustainability Objective 1

Examples of problems include rising levels of heavy metals in the soil, phosphate in lakes, sulphuric acid in forests and carbon dioxide in the atmosphere. Nature cannot sustain systematic increases of any substance. Every single atom of mercury, lead, zinc, copper or coal that we extract from the Earth's crust, must end up somewhere.

Make a list of the critical flows of your firm, such flows that are likely to contribute to problems of this kind, problems with reference to sustainability objective 1.

Sustainability Objective 2

Examples of problems include a number of non-biodegradable substances not found in nature, such as chlorofluorocarbons (CFCs), polychlorinated biphenols (PCBs), many pesticides, dioxins, bromide anti-flammables and many additives in plastics such as chlorinated paraffins. The manufacturing of substances is either intentional (such as in the chemicals industry) or unintentional (such as by-products created during waste incineration). Substances not broken down and integrated into the natural cycles will build up in the environment. When emissions are large, naturally occurring compounds may also increase in concentrations. For instance, NOx that cause problems such as eutrophy, acidity and ozone depletion.

Make a list of the critical flows of your firm, such flows that are likely to contribute to problems of this kind, with reference to sustainability objective 2.

Sustainability Objective 3

Examples of problems include clear-cutting of forests, spreading deserts, loss of nutrients, construction of roads and buildings on fertile land, over-fishing in seas and lakes, mass tourism in pristine areas of nature and damage to sub-soil water flows.

Make a list of the critical flows of your firm, such flows that are likely to contribute to problems of this kind, problems with reference to sustainability objective 3.

Sustainability Objective 4

Examples of problems include the uneven distribution of resources within humanity, leading to problems like famine and lack of safe drinking water in large regions of the world at the same time as the industrialized world spends more resources than we want on, for instance, traffic jams, and suffers from alienation and loss of cultural meaning.

Make a list of the critical flows of your firm, such flows that are likely to contribute to

problems of this kind, problems with reference to sustainability objective 4.

C *How Does the Organization Look in a Sustainable Society?*

Here, we develop a vision of how a sustainable organization might look. The point of the exercise is to 'lift the vision,' look for solutions and free oneself from preconceptions based on prevailing conditions. The way to approach this is to learn to envisage the organization as a service provider. What utility is the customer really looking for? What needs are fulfilled by our organization? How can we satisfy the customer's needs in a sustainable society? Are we selling cars or mobility? Are we selling kilowatt-hours or light and heating? In what way is fairness at the global level important to our activities?

Next, we list every conceivable means of meeting the needs of our customers without compromising our ultimate sustainability objectives. It is not enough to take action to avoid the mistakes that have already started causing environmental damage.

If this process is overseen with proper care, there can be far-reaching consequences and opportunities. The organization may even, as a result, change its mission statement and find new and promising market segments.

Sustainability Objective 1

Sustainable options are to switch to renewable fuels and materials such as wood, fibers, ceramics, glass, et cetera. We can also discriminate in favor of metals commonly found in nature. The more common a metal is in nature, the more freely we can use and recycle it without fear of rising concentrations. Aluminum and iron, for instance, are considerably more common in nature than copper and cadmium. Using metals efficiently and establishing sophisticated recycling systems, are other ways of avoiding rising concentrations in nature. Even in a sustainable society, it may be necessary to increase mining of particular substances in the short term. An example of this would be certain rare metals needed in solar cells—and later recycled, of course. The effects would be beneficial, as solar cells reduce the need for non-renewable fuels.

List solutions with reference to the general description of options presented above, make a list of all the options with reference to sustainability objective 1 that would be available for your firm. It is important that this is done through brainstorming. Everything that is theoretically possible should be listed.

Sustainability Objective 2

Sustainable options include the phasing out of substances that do not readily biodegrade and are not commonly found in nature. It may also be necessary to control a range of other substances that, even though biodegradable, are nevertheless building up in nature because of excessively high volumes in use. This can be done by using substances efficiently and establishing sophisticated recycling systems. Even in a sustainable society, it may be necessary to occasionally use non-biodegradable substances not normally found in nature. Such as, for instance, important pharmaceuticals, which can later be separated from body secretions. However, this will only apply if there are no better alternatives that are safe to use without constant monitoring.

List solutions, i.e. – with reference to the general description of options presented above – add to the list of solutions all the options with reference to sustainability objective 2 that would be available for your firm. It is important that this is done through brainstorming, i.e. everything that is theoretically possible should be listed.

Sustainability Objective 3

Sustainable options are to buy sustainably grown food and raw materials from well-managed forestry plantations. By locating new factories on the foundations of old ones and planning all construction with respect for nature, we can minimize our presence in nature. Another sustainable option is to become more efficient – for example, companies can plan strategically to reduce the need for long-distance transportation.

List solutions, i.e. – with reference to the general description of options presented above, add to the list of solutions all the options with reference to sustainability objective 3 that would be available for your firm. It is important that this is done through brainstorming, i.e. everything that is theoretically possible should be listed.

Sustainability Objective 4

Sustainable options. These all include measures to increase the human utility per resource unit. Examples are to find completely new, and more sophisticated ways of meeting the same human needs. For instance, IT technologies can substitute for transport and provide more human benefits at the same time. Other examples are various ways of reducing resource flows, and thereby costs, to make such products that are important for human needs available also for relatively poor people. For instance, filters that can manufacture drinking water from polluted water, rather than exporting drinking water at large financial and ecological costs. Other options are to move into markets in developing parts of the world, and to find ways of adding social costs to prices of resources purchased from such areas.

List solutions, i.e. – with reference to the general description presented above, add to the list of solutions all the options with reference to sustainability objective 4 that would be available for your firm. It is important that this is done through brainstorming, i.e. everything that is theoretically possible should be listed.

D *Strategy for Action*

Environmental programs with targets and measures to improve profitability are designed in this step.

By choosing measures from C that stand up favorably to the key questions outlined below, long-term and short-term profitability are linked – and each step becomes profitable in itself:

1. *Are we moving towards our objectives?* Each suggested measure is assessed against the environmental objectives. Does the measure reduce our dependence on, for instance, heavy metals (sustainability objective 1) or non-biodegradable substances not usually found in nature (sustainability objective 2)?
2. *Are we creating a flexible platform for further improvements?* It's important to choose

solutions that are as flexible as possible, so they can be further developed in a sustainable direction. Otherwise, we might end up in a cul-de-sac. If technical or economic conditions change, investments in flexible solutions will ensure that adjustments do not bring punitive costs. Can our new, lean-burn engine be modified to use renewable fuels? Is this expensive plant for recycling of heavy metals really a smart decision – shouldn't we substitute those materials for others instead?

3. *Will the measure bring quick enough financial returns?* We prioritize 'low-hanging fruit' – in other words, measures that bring improved profitability even in the short term or in other ways generate comparatively quick returns on investments. Does the measure bring resource savings? Can this measure help improve our sales figures? Can this measure help us reach a new market segment? Can it generate profits through new marketing strategies to increase customer brand loyalty?

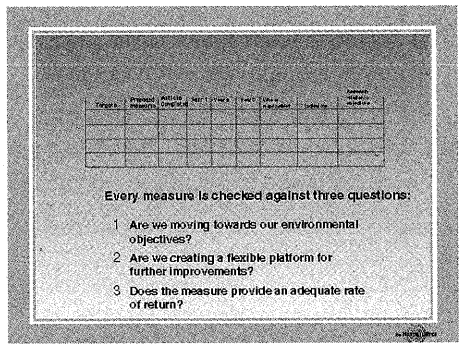


Figure 7. Strategy for Action.

By using The Natural Step Framework in our planning, we can choose investments and measures with maximum flexibility in the long term and maximum profitability in the short term. With clever planning, it's possible to go forward without bringing yesterday's problems into the future. Realistic measures applied today will affect only the *speed* of change, not its *direction*. That is the essence of systematic planning through backcasting.

The leaning walls of the funnel will systematically increase the relative advantages of proactivity and pose increasing risks for those who are late in the transition. So, The Natural Step's framework focuses on "backcasting from success." This complements the more traditional way of planning—"forecasting from problems." The traditional forecasting perspective provides a planning procedure with relevant information on today's impacts on nature, and how these impacts influence current market trends. This approach is oriented around current trends, and responds to actual market demands from a competitive point of view. The weakness in solely applying a forecasting perspective in a planning procedure is that it deprives the

planning process of a sense of direction and may lead into blind alleys. Incremental changes can sometimes be counter-productive, even if they are reducing today's impact on nature. Incremental changes of an old system can lock up resources that could be used in a strategically smarter way. Finally, using forecasting approaches alone makes it difficult to deal with tradeoffs. When combining the two perspectives, backcasting gives the direction of planning, and forecasting can provide important information on relevant market trends and sometimes also influence the choice of smart "stepping-stones." In the following, a few concrete examples from business will elucidate this distinction.

Some Examples of Applying The Natural Step Framework

The Natural Step is non-prescriptive. This means that business examples are all provided by individuals and firms applying the The Natural Step framework, whereas The Natural Step as an organization only uses such examples to make it easier to understand the utility of the framework.

An Example from Electrolux

An example of concrete planning comes from Electrolux, which started the planning to get rid of CFCs by forecasting. The first option they considered was to substitute HCFCs for CFCs since HCFCs have a lower impact on the ozone layer. This plan was further supported by an LCA that had the forecasting-perspective. It had revealed a tradeoff between HCFC on the one hand (with its uncertainty on the future market), and the high efficiency of HCFC-produced insulation on the other. Considering that the main environmental impact from a refrigerator is not during its production (relatively small amounts of HCFCs), but during the time it is used (relatively large amounts of emissions from the energy-sector), this forecasting analysis had favored HCFC technology. However, by applying backcasting from the system conditions, the management team of Electrolux realized that the switch to HCFC would imply an expensive transition into a blind alley, since there was no room for the relatively persistent HCFCs in their future scenarios (based on system condition 2). So instead they chose a "flexible stepping stone" by using the chemical R134a as an intermediate step. This technology fit in well as a flexible platform from which to move to the next generation of hydrocarbons and, at the same time, R134a fit in well with current trends in the market. Electrolux was first in launching a whole family of freon-free refrigerators and freezers. The result was increased market shares in several important markets and relatively higher revenues from those particular products.

An Example from IKEA

The following example comes from Russel Johnsson, head of environment at IKEA at the time. Replacing an incandescent lamp with a CFL (Compact Fluorescent Lamp) will give considerable savings in energy consumption and electricity costs (roughly a factor of 5) and a considerable increase in product life (factor of 8-10). But the high price has been an obstacle for the private households to dare to prove these facts to themselves in practice. The typical price level in Sweden at the time was 120 SEK (15 USD) for an 11 W CFL (corresponding to 60 W incandescent lamp). Another problem is that CFLs have higher mercury content than incan-

descent lamps.

The trade-off problem is between higher use of mercury (sustainability objective 1), lower expenditure of energy (sustainability objective 1 and 2) and higher costs for the lamps lowering their availability to the public (sustainability objective 4). A more creative methodology than trying to estimate if the impacts outweigh the benefit, is to start the planning procedure from a point where the tradeoffs don't exist—backcasting from compliance with the system conditions. In short, these were the steps to move in that direction:

Russel Johnsson: "We identified a producer who could provide a good-enough combination of the listed criteria to serve as a platform. We wanted a good reliable CFL with a maximum of 3 milligrams of mercury per lamp, which can be compared to the requirements in the European Union environmental labelling system for such lamps, which is a maximum of 10 milligrams on the global market (factor 3). A Chinese manufacturer, outstanding both from product design and production technology points of view, could meet those requirements at the same time as he was competitive enough on price.

We let this producer and his competitors know that as long as he would be ahead of his competitors as regards price, energy expenditure and mercury contents, he would continue being a supplier to IKEA.

During the fall of 1997, we started the Swedish marketing campaign for CFLs. It consisted of the following steps, which would bring us further in the right direction:

(i) Price cuts to 1/3 for the 11 W (ca 5 USD) and less than 1/2 for the other lamp sizes.

(ii) Cooperation with the largest Swedish environmental organisation, the Swedish Society for Nature Conservation (SSNC), around a public information campaign about energy (and cost) saving possibilities for households.

(iii) Advertising in all major daily newspapers, offering all households to collect (during a two-week period)—free of charge—an 11 W CFL in our stores in order to convince themselves that CFL is a very profitable choice for their homes. Somewhere between 500,000 and 600,000 lamps were given away.

(iv) Before launching the campaign we visited, together with SSNC technical expertise, our CFL supplier in China. We met their management, made a thorough review of the factory with special focus on the company's environmental management system and practices, work and worker's conditions. We also visited the supplier's RD&E department and discussed possibilities for further reducing the mercury content and other potential environmental improvements. We documented our visit on video and edited video cassettes were later distributed to all our Swedish stores.

(v) We informed customers about the very serious environmental dangers with mercury and offered to take back (free of charge) all their used light sources containing mercury to IKEA stores. We made a contract with a major recycling company (RagnSells) to take care of all such returned light sources with mercury, including all those we generate ourselves in stores, warehouses and offices. 98%

to 99% of the mercury is recovered by a specialist company in Germany. Together with SSNC, we made a thorough review of this company also and documented it on the video cassette mentioned above."

As a result of this campaign, the private household sales of CFLs in Sweden have increased considerably. The competition had to decrease their prices. Our CFL sales have increased. IKEA's campaign has been good for everybody—for the customers and for the country—except the manufacturers and importers of incandescent lamps. If every Swedish household replaced 20 pieces of 60 W incandescent lamps with 11 W CFLs, the resulting yearly energy savings would equal the production of one of the Swedish nuclear reactors."

How Does The Natural Step Framework Relate to Tools for Sustainable Development?

We have presented a general framework to plan for sustainability. This framework follows from principles for how a system is constituted (ecological and social principles), and contains principles—the system conditions—for a favorable outcome for the system (sustainability), as well as principles—strategic principles—for the process to reach this outcome (sustainable development). The system conditions define the favorable outcome and direct problem-solving upstream toward problem-sources. A program of activities is then constructed by backcasting from defined outcomes to the current problems. This should be followed by "metrics," which are various concepts for measuring and monitoring the activities so that those are really complying with the strategic principles to reach the favorable outcome in the system we have just described.

Most concepts and tools for sustainable development function as metrics, including Life Cycle Assessment (LCA), Ecological Footprinting (EF) and Factor X. When used in a strategically smart way, those tools are selected and designed in a way that helps the firm to actually reach its environmental objectives. A framework such as The Natural Step Framework is a methodology to create a sense of direction to the planning, and tools are then used to see to that the process actually complies with the overall planning.

An Environmental Management System (EMS), like ISO 14001 or EMAS, is an administrative vehicle that should systematically align a firm's specific outcomes, activities and metrics with a general framework for sustainability. From a strategic point of view, metrics should measure alignment of activities with the principles contained in a framework for sustainability.

Of this, it follows that a framework is not an alternative to various tools for metrics. We need them all because they represent different interrelated levels of strategic planning. (Fig. 8) Imagine the analogy of running an airplane where:

- the firm is the airplane,
- the framework is the guidelines for planning this particular journey (to sustainability), including the map with the objective, plus a description of the principles for reaching that objective,
- the EMS is the manual and checklists needed to handle that specific airplane in line with the framework,

- the activities are everything that takes place on board,
- and the metrics are performed with the instruments needed for that airplane on this route, so that the activities comply with the plan for the flight.

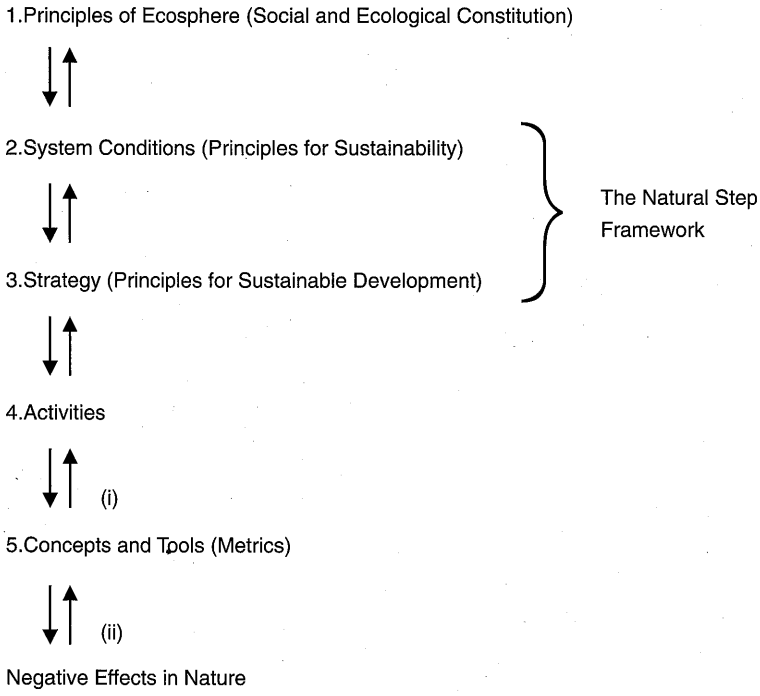


Figure 8. Hierarchical relationships between principally different levels of planning in a complex system.

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