

# Chapter 3. Adopting Integrative Thinking to Change Perspectives and Decision-Making Processes

***The economies of Asia have already entered a period of crisis in their access to the resources needed for continued development, poverty reduction, and environmental protection. Major improvements in resource efficiency—not just modest incremental changes—are essential. Responding adequately demands greater integration and coordination across several dimensions of resource management.***

This chapter describes four important dimensions of integration that policy makers need to consider:

- Integrative planning across economic, social, and environmental spheres;
- Materials, energy, water, and land as integrated systems;
- Integrative planning across naturally defined regions; and
- Integrative planning across time horizons.

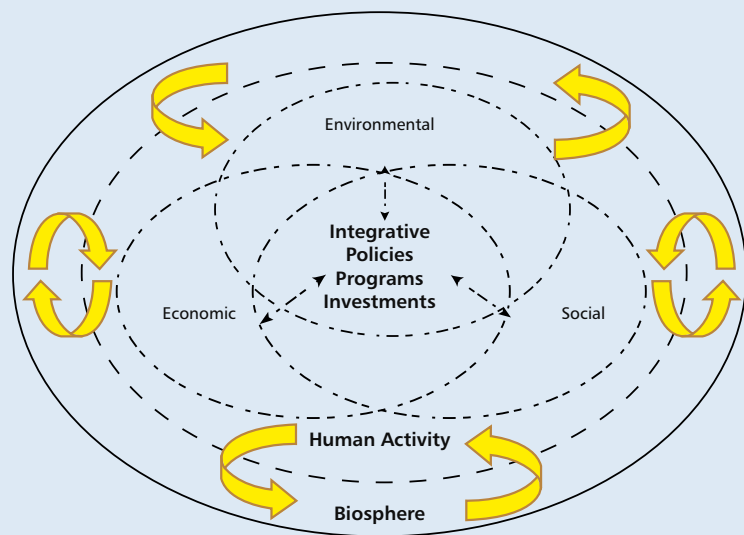
## Integrative Planning Across Economic, Social, and Environmental Spheres

One of the keys of sustainable development is recognizing that economic, social, and environmental systems are actually complementary, not in conflict. The three systems are coequal and interdependent, with major areas of overlapping interests (Figure 3.1). However, the reality is that integrative planning across these three fundamental realms of sustainable development is a challenge. Experts and other stakeholders in each realm tend to claim that their perspective embodies the most important issues for true

sustainability. The priorities for resource efficiency appear quite different when viewed through an environmental lens than through a social or economic one.

Those who are primarily concerned with the environmental dimensions of development tend to place the highest priority on the health of ecological systems and see the economy and society as subsystems of the biosphere. They warn of limits to growth, arguing that there are constraints set by the stocks and flows of natural capital and a regional and global carrying capacity that cannot be exceeded. Exceeding these limits will strain natural systems and could lead to their collapse.

Figure 3.1: Interface of Sustainable Development Dimensions



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Source: Lowe, Ernest. Indigo Development. 2007. Industrial Ecology: Holistic Framework for Resource Efficiency. Presented at the 3R Workshop on Effective Waste Management and Resource Use Efficiency in East and Southeast Asia, ADB Headquarters in Manila, Philippines, 15–16 February. Available: [www.adb.org/Documents/Events/2007/Effective\\_Waste\\_Management/Ernest\\_Lowe\\_presentation.pdf](http://www.adb.org/Documents/Events/2007/Effective_Waste_Management/Ernest_Lowe_presentation.pdf)

that their repair is wrongly measured as contributing to gross national product (GNP). They believe that a healthy market economy will tend to reward ventures that seek to meet environmental and social needs. They also seek to create market incentives that will encourage technical innovations to respond to rising resource prices or to increase resource efficiency. Social scientists and activists make effective governance, social and environmental justice, and equity in income and wealth distribution preeminent. Achieving these goals will assure environmental stewardship and sustainable economies. They are also important to moving toward a much more peaceful world, for communities, cities, and world order.

These often contrasting viewpoints and the difficulty of their integration have sometimes led decision makers to address challenges by taking action in only one of these areas. This risks intensifying problems in the other areas, which in turn can loop back to have negative impacts on the original area of focus. For instance, investments in a new dam to improve water supply in an economy (economic focus) may destroy wildlife habitat (environment). Poverty increases if there are weakly compensated, displaced communities who can find no new land to farm (social). The resulting political instability can translate into significant costs (economic).

Resource efficiency is a clear area where economic, environmental, and social considerations offer overlapping benefits. For those focusing on the environment, high resource efficiency is a way to reduce environmental stress. For economists, high efficiency increases profits and competitiveness. And for social scientists, high resource efficiency can contribute to seeing that everyone has their basic needs met. This should allow actors in the three realms to negotiate creative synergistic solutions, making trade-offs as necessary to move toward increased sustainability.<sup>90</sup>

<sup>90</sup> Schnurr, Jamie, and Susan Holtz, eds. 1998. *The Cornerstone of Development: Integrating Environmental, Social, and Economic Policies*. Ottawa: International Development Research Centre.

## The Environment and Poverty

One important link that is just beginning to be fully understood is between the environment and poverty. Due in part to rapid economic growth in many countries, millions of people in Asia have been able to lift themselves out of extreme poverty (those living on \$1 a day or less). In 1990, one person in three in the PRC lived in poverty. Today, that number is below one in ten. There is an enormous opportunity to improve the well-being of many more millions of people through further development.

However, environmental degradation and resource depletion threaten these recent advancements. Even as resources continue to be degraded throughout the region, millions of poor people depend on natural resources for their livelihoods and well-being, including products provided by ecosystems (e.g., food, fuelwood, and freshwater), the functions they serve (from regulating the climate to soil formation), and their recreational, aesthetic, and spiritual benefits. As described earlier in this paper, the poor, and especially the rural poor, are also especially vulnerable to future changes, such as seasonal and climatic variation.



Source: ADB.

The challenge of poverty reduction—including promoting the conditions for improved human health, securing the basis of rural livelihoods, and conserving the environment—is particularly acute in Asia and the Pacific. The region is home to half of the world's population, many of whom still live in poverty despite recent economic growth. Can these people be lifted out of poverty while reversing trends in natural resources degradation? Understanding and resolving these relationships holds the key to poverty reduction and better ecosystem management.

### Box 3.1: ADB's Poverty and Environment Program

Financed by governments of Sweden and Norway and the Asian Development Bank (ADB) through ADB's Poverty and Environment Fund, the Poverty and Environment Program (PEP) supports demonstration projects and analytical studies and disseminates information on the linkages between the environment and poverty. PEP is now in its fourth year and, thus far, 16 subprojects across the region have been funded for \$3.3 million.

The PEP has three components:

- **Targeted analytical studies.** As an example, the *Poverty, Health and Ecosystems* report, jointly published by ADB and the International Union for Conservation of Nature and Natural Resources (IUCN), explores the state of knowledge on the links between poverty, health, and environment. It aims to improve understanding of issues of governance, rights, and responsibilities as fundamental links between conservation and human well-being. The study also explores the role of gender equity; and identifies tools, strategies, and targets to address the links between health, poverty, and conservation.
- **Information Dissemination of Success Stories.** The PEP website ([www.povertyenvironment.net](http://www.povertyenvironment.net)) was launched to systematically gather and synthesize knowledge on poverty–environment relationships culled from the experiences of PEP-funded activities, ADB projects, and projects supported by other organizations.
- **Pilot Interventions.** Pilot projects are being implemented in the People's Republic of China, India, Maldives, and Viet Nam. Some of these projects are discussed in the next section.

A number of pilot projects focus on developing sustainable livelihoods for people living around protected areas. One innovative project in Viet Nam is supporting biodiversity corridor development in Lam Dong Province and establish approaches that allow for the integration of protected area management, rural livelihood improvement, and poverty reduction, and support to environment-friendly resource use patterns. The selected biodiversity corridor is located in a central highland area where about 46% of the rural households live in poverty. Pilot interventions include reforestation and forest regeneration (on scrubland and deteriorated protection plots), animal husbandry (cattle and a local small-framed pig species), and farming systems (provision of planting materials for fodder grass and coffee) in combination with a number of technical training courses.

Source: ADB.

This multidimensional approach to poverty reduction has been encapsulated in the MDGs, which include the need to improve not only incomes, but also health, education, gender equity, and environmental sustainability. Many development agencies have now endorsed these goals and are using their achievement as key indicators of progress. ADB is also fostering institutional learning about the links between poverty and environment through its Poverty and Environment Program (Box 3.1)

Deeper structural reforms are necessary in many countries to make further inroads into reducing poverty and unemployment. These include reallocating fiscal expenditures toward programs that favor economic growth and the poor. For instance, businesses in some countries continue to identify lack of investment in infrastructure as a major impediment to business activity and investment (Chapter 7). This serves to drag down economies and ultimately hurts the poor.

At the same time, many policies encourage resource inefficiency. For example, expenditures are still being directed to inefficient fuel subsidies. Whether directly or indirectly controlled, in over half the Asian economies, regulated prices were raised as world oil prices rose. Some governments view price controls and subsidies as an important way of providing support to those on low income, but poor targeting often means that these subsidies are captured by other groups. Since many countries finance their subsidies through the budget, such subsidies not only create perverse incentives but they also divert money from much-needed social programs.<sup>91</sup>

<sup>91</sup> ADB. 2007. *Asian Development Outlook 2007 Update*. Manila.

## Environmental Protection and Jobs Creation

Another benefit, both to the social and economic spheres, is jobs creation. Contrary to general public opinion, environmental management, regulation, and investment have been shown to create and protect jobs at a significant level. Studies in the US have found that the environmental sector may be larger than previously thought and extend well beyond traditionally identified scientific and physical management jobs. The vast majority of jobs created by environmental protection are standard positions, such as accountants, engineers, computer analysts, plumbers, factory workers, truck drivers, and mechanics.<sup>92</sup>

In addition, job creation and environmental investment are not only compatible, they are strongly synergistic, with investment in environmental programs likely to generate greater than proportionate employment. For instance, the impact of increased sales of water treatment plants, biomass refineries, or air pollution control equipment in Asia will reach far beyond the systems themselves because the installation of these systems requires procurement of large quantities of components and services. Large system suppliers purchase fans, motors, material handling systems, steel structures, vessels, pumps, valves, piping, and instrumentation from other suppliers. For every full-time employee in the primary contractor there are 3–4 full-time employees in the component companies working to supply the needs of the prime company.<sup>93</sup> Thus, developing countries benefit from viewing the environmental industry as a potential source of employment and long-term asset development, improving social conditions while protecting the environment.

## Materials, Energy, Water, and Land as Integrated Systems

Integration for resource efficiency in policy making and investment should emphasize interactions and

<sup>92</sup> Opschoor, Hans. 1995. *Sustainable Growth and Employment*. The Ecumenical Leadership Foundation. Available: <http://www.jaysquare.com/resources/workdocs/wdoc11c.htm>

<sup>93</sup> Mcllvaine Company. 2001, January. *U.S. Industry Market Leadership in Asia's Air Pollution Control Sector*. Prepared for the US-Asia Environmental Partnership. Washington, DC.

efficiency improvements among the basic resource flows and stocks, including materials, energy, water, and land. When focused on one type of resource, it is important to always consider how it interacts with others, because the production or use of each type of resource places demands on all the others.

The policies and practices of sustainable agriculture illustrate the power of integrative planning and management to achieve high resource efficiency. The transition to sustainable agriculture requires integration and coordination across all the dimensions. Achieving a successful transition requires coordination on a regional or even national scale, working over a long timeframe, and integrating the management of materials, energy, water, and land. It also requires collaboration among different agencies and academic disciplines in policy, research, education, and training.

Sustainable farming practices are not new and are practiced to some degree in traditional farming. However, evolving approaches are allowing farmers to get closer to closed resource cycles as described in Chapter 1. The concept of sustainable agriculture is to work with the farm as an adaptive ecosystem in which the farmer manages all resources as a whole system, reducing external resource inputs and reusing all residues on site or with neighboring farmers. This involves

- restoring and building the soil through ecological methods that blend mineral, bacteriological, and organic amendments as well as cover crops (green fertilizer);
- using water with high efficiency of input per unit of output;
- using renewable energy and minimizing use of petrochemical input;
- utilizing organic residues (biowastes) as input to soil productivity and for production of bioenergy;
- practicing integrated pest management that utilizes natural predators and microorganisms to kill damaging insects; and
- integrating the farm into its ecological context through restoration of wetlands, hedgerows, and marginal plantings of wildlife habitat.

Increasingly, agricultural policies and practices must also take into account the increasing production of biofuels. National officials must answer important

questions before deciding to promote widespread production. How feasible is development of crop-based biofuels, given the availability of land, water, and fertilizer in a particular country? Is it possible to achieve a net energy gain, or does a planned crop-to-biofuel project use more energy than it creates, thereby actually reducing resource efficiency? Does this land use reduce food security by reducing space for food crops?

There are strong movements to achieve a transition to sustainable farming in a number of Asian countries, including the PRC, India, and Thailand. This transition will lower external resource input costs while increasing competitiveness domestically and in export markets.<sup>94</sup> Specific measures that can be taken to improve materials, water, and energy efficiency in agriculture are presented in Box 3.2.

The use of an integrated approach to resource management is also applicable and highly cost effective for specific real estate development projects, such as apartment building or hotel design. The built environment can use up to 40% of a country's energy supply and a significant volume of water. Construction also uses a large volume of materials and a large area of land. The costs of operating a building's energy and water systems over a lifetime usually surpass its total initial construction costs. This realization has led designers to integrate new (and sometimes old) methods for designing and operating buildings combined with application of renewable energy technologies, resulting in very high resource efficiency.<sup>95</sup> High-performance "green" buildings are discussed in Chapter 8.



Source: AFP.

<sup>94</sup> International Fund for Agricultural Development (IFAD). 2005. *Going Organic in Asia*. Rome: IFAD.

<sup>95</sup> Kibert, Charles J., Jan Sendzimir, and Bradley Guy, eds. 2001. *Construction Ecology and Metabolism: Nature as a Model for the Built Environment*. London: Spon Ltd. (See University of Florida, School of Construction website for other resources on high performance design: <http://www.bcn.ufl.edu>)

## Integrative Planning Across Regions: The Urban to Rural to Wild Continuum

Typical planning processes fragment different types of land use in a region, focusing on urban or rural or wild land without perceiving the interactions among them. Fragmentation is typical across regional economic sectors and land-use types in both developed and developing countries. The result is that farms send food and fiber to urban markets and cities send organic wastes to landfills, incinerators, and sewage treatment plants, but not to the places of origin of the organic materials. In this linear flow, urban waste management pollutes waterways and air and also contributes to GHG emissions. Infrastructure and pricing mechanisms fail to support the return of organic materials to the locations of their highest-and-best use, either as soil restoration nutrients or as energy to grow additional food in a sustainable manner. These failures in regional planning result in low resource efficiency for all types of resources in urban, rural, and wild areas of a region.

Integrative regional planning is a process seeking to optimize solutions by addressing multiple regional issues as a whole system. It may begin with a defined problem or a proposed solution. How do we increase the efficiency of water use by all sectors in our arid region? What government and business support is required for farmers to learn sustainable farming? Can we reduce GHG emissions throughout the region and increase the efficiency of our economy?

One area in which integrative planning is essential is making economic use of the huge amount of biomass waste overloading landfills around the region. The use of biomass residues from urban and rural areas, as well as from wild land, may enable production of major bioenergy and biomaterial products. This will involve system innovations in transport (biofuels), electricity generation (co-combustion, gasification of biomass), agriculture (biocrops), and policy (integral biomass policy regarding energy, biodiversity, space use, agriculture, and transport).<sup>96</sup> The core issue is planning sustainable programs and initiatives to absorb this largest component of both urban and rural waste,

<sup>96</sup> Loorbach, Derk, and Jan Rotmans. 2004, January. *Managing Transitions for Sustainable Development*. International Center for Integrative Studies (ICIS). Maastricht: Maastricht University. Available: [www.icis.nl](http://www.icis.nl)

### Box 3.2: Promoting Materials, Water, and Energy Efficiency in Agriculture

**Materials.** The health of the land itself is a foundation of resource management in sustainable farming. This principle determines many of the practices relating to efficient use of materials. Sustainable farming practices contribute to overall efficiency of materials use by greatly reducing petrochemical inputs (and their containers), recycling on-farm residues, rebuilding and conserving the quality of soil, and preventing its erosion. Fully applied, sustainable farming increases the output per unit of material input and land area.

Following are some basic material resource strategies for sustainable farming:

- Material inputs derive from the farm itself in a closed-loop system, except for special mineral or bacteriological micronutrients and equipment, such as drip irrigation systems and small tractors.
- Plant and animal residues are recycled to build soil quality and productivity (with an option of generating energy through use of digesters), which can reverse the waste of the land resource degraded by conventional farming practices.
- Organic and mineral nutrients are applied with guidance from real-time soil testing to determine the level and balance of nutrient application.
- Integrated pest management eliminates (or greatly reduces) use of polluting chemicals.
- Cropping strategies can increase overall farm output and the efficiency of resource use. These include selection of varieties to grow in each part of the production cycle; crop rotations; and mixing appropriate crops to diversify output, strengthen soil, and reduce risk of pests.

**Water.** Sustainable farming seeks to minimize external inputs and optimize all resources native to each farm and farm region. For water, some of the basic strategies are:

- Build organic content of the soil and water retention through composting, cover cropping with “green manure” (often with legumes that are plowed under), and minimal cultivation of the surface.
- Practice intensive farming with multiple crops intermixed to increase the output per unit of water and land input (and the resistance to pests).
- Structure fields to minimize erosion and to create ponds and wetlands. (The first two strategies also limit erosion.)
- Use moisture sensors to determine when and how much water to apply.
- Use drip irrigation (low-volume water application) devices, flooding fields only when necessary, and avoid use of sprinklers.
- Capture storm water from rooftops and uncontaminated paved areas and store in ponds or tanks.
- Recycle gray water from households and use low water or composting toilets.
- Reduce loss of water through lining irrigation canals.

**Energy.** There are three levels of energy inputs to agriculture: (i) the energy required to produce farming supplies; (ii) direct use of fuel and petrochemical products on the farm; and (iii) the energy of cultivation, irrigation, storage, transportation, and processing. Producers may achieve more efficient energy use in Asian farming through incremental improvements at each of these three levels. Strategies for optimal energy use are:

- Reduce or eliminate application of artificial fertilizer, pesticides, herbicides, and other energy intensive inputs.
- Use renewable sources wherever possible, especially bioenergy from farm and urban residues (chapter 8).
- Reduce cultivation and plant more diverse crops in a land-intensive mode (thus increasing output per unit of energy input).
- Use relatively lightweight equipment with low energy demand and impact on soils. Revive animal traction for cultivation, harvest, and hauling as feasible.
- Use ground heat pumps to provide baseline energy to households, greenhouses, and farm buildings.
- Produce for local and regional markets and reduce long-distance shipping (except for high-value or value-added products).

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*Box 3.2 continued*

In addition, a major factor in application of energy to farming is the high energy required for meat and poultry production. Therefore, a major way to save energy in the agricultural sector is to end or reduce incentives for factory farm grain-fed meat and poultry production and to provide consumer education for a healthy, balanced diet with an "appropriate" share coming from meat and poultry.

Source for materials and water list: Ernest Lowe.

Source for energy list: International Fund for Agricultural Development (IFAD). 2005, July. Organic Agriculture and Poverty Reduction in Asia: China and India Focus, Thematic Evaluation. *IFAD Report* No. 1664. Available: [http://www.ifad.org/evaluation/public\\_html/eksyst/doc/thematic/organic/asia.pdf](http://www.ifad.org/evaluation/public_html/eksyst/doc/thematic/organic/asia.pdf)

while integrating its use with appropriate bioenergy crop cultivation. This new approach to renewable energy can be integrated into a sustainable regional planning process and avoid the likely negative consequences of fragmented planning.

Development of bioenergy resources is a very active field of both public and private environmental investment on every continent. Increasing concern for the impacts of climate change has driven worldwide interest in growing crops for biofuels. The European Union (EU) adopted a Biofuels Directive in May 2003 to promote the use of biofuels in transport. The US President has presented a "billion ton vision" to produce 1.3 billion tons of dry biomass for the biofuels industry by 2050, providing 30% of US fuel needs. Fifteen percent of US corn production already goes into feedstock for ethanol. In Brazil, 40% of nondiesel fuel is ethanol, produced from sugar cane. The President of Brazil has signed a memorandum of understanding with the US to provide technical assistance to other Latin American countries in development of biofuel crops and processing.

Bioenergy promoters assert that atmospheric carbon can be minimized by investing in energy technologies that utilize crops or other organic by-products. Benefits will be greatest if material outputs from energy processes are used in sustainable soil and landscape restoration. However, increased use of biomass for energy raises serious regional issues. For instance, some leading analysts say that ethanol production from corn requires more fossil energy than the "renewable" energy it yields. They also say that large corn plantations are very damaging to the farm soil, regional waterways, and surrounding ecosystems.<sup>97</sup>

Thus, promotion of biofuels requires a robust regional planning response involving all stakeholders and consultation with national and international sources of scientific validation. This process should address a number of important questions:

- What land will be chosen for these large plantations? What other agricultural and ecosystem functions will be displaced?
- How will the initiative avoid the likely ecological consequences of monoculture plantation tree farming, particularly given the tendency of such species to be invasive?
- How will the initiative planners preserve biodiversity?
- What is the fossil energy balance for the whole process of growing and producing this biofuel? Does it produce more energy than it requires from fossil sources?
- What economic structures can assure that the region and its communities will share in the profits of the enterprise, beyond low-income farm employment?
- How would growing this single biofuel species fit into a comprehensive system for energy generation and fuel production from biomass?
- How would this system benefit from and support sustainable farming in the region?

### Integrative Planning Across Time

Policy makers and investors often plan in a relatively short time frame. They make choices that appear cost effective in the present but create major economic or environmental problems in the future. Or they may

<sup>97</sup> Pimentel, D., and T. Patzek. 2005. Ethanol Production Using Corn, Switchgrass, and Wood and Biodiesel Production Using Soybean and Sunflower. *Natural Resources and Research* 14(1): 65–76. Patzek, Tad. 2004–6. Thermodynamics of the

Corn-Ethanol Biofuel Cycle. Online edition of article first published in *Critical Reviews in Plant Sciences* 23(6):519–567 (2004). Available: <http://petroleum.berkeley.edu/papers/patzek/CRPS416-Patzek-Web.pdf>

simply not take into account major changes and risks that are on the horizon.

For instance, in the short term, solid waste disposal and sewage treatment demand quick solutions. However, investment in large infrastructure or building projects locks in the environmental, economic, and social impacts of initial planning decisions for decades. Deciding on conventional designs rather than high performance and integrated designs is likely to result in high operating costs and environmental impacts. Thus, investments should be planned in the context of a transition to full resource optimization, with highly successful waste minimization (reduction) and resource recovery (reuse and recycling).

There are many principles, methods, and tools to support long-term planning for investment decisions over time. Three of these are discussed below.

### The Precautionary Principle

One of the most basic foundations for evaluating public or private activities and new technologies for resource efficiency is the precautionary principle, adopted into government policy and planning by the European Commission, international agreements, and a number of jurisdictions in the US.

“The precautionary principle is a general rule of public policy to be used in situations of potentially serious or irreversible threats to health or the environment, where there is a need to act to reduce potential hazards before there is strong proof of harm, taking into account the likely costs and benefits of action and inaction.”<sup>98</sup>

Climate scientists have argued for precautionary actions to reduce GHGs for close to three decades. The precautionary principle should also be followed when applying new technology innovations that may lead to future negative impacts unforeseen or denied by their developers. These may include genetically modified crops, some applications of

nanotechnology, and overemphasis on substituting biofuel crops for food crops. Policy makers and investors need to work with independent evaluation experts to determine which should be implemented.

Inevitably, this principle provokes controversy, with technology developers insisting there is inadequate proof that the risks will be fulfilled. However, the precautionary principle places the burden of proof on the developer, so long as there is an adequate scientific basis for challenging the innovation.

The European Commission, university researchers, and several nongovernment organizations (NGOs) have developed handbooks and guidelines for using the precautionary principle. These include the Communication on the Precautionary Principle from the European Commission in 2000 and the Council of Ministers Nice Decision, also in 2000. They have made significant contributions to the practical implementation of the precautionary principle, especially concerning stakeholder involvement and the avoidance of trade disputes.

### Transition Management

Two institutes in the Netherlands—International Centre for Integrated Assessment and Sustainable Development and Dutch Research Institute for Transitions—have led the development and application of methods for more integrative planning across time under the concept of “transition management.”

“In general terms, a transition can be portrayed as a long-term process of change during which a society or a subsystem of society fundamentally changes. Transitions require system innovations: organization exceeding, qualitative innovations, which are realized by a variety of participants within the system and which fundamentally change both the structure of the system and the relation among the participants. It is within these systemic innovations that innovations at the individual level occur, in terms of product, process and project innovations.”<sup>99</sup>

<sup>98</sup> European Environment Agency. 2001. Late Lessons from Early Warnings: the Precautionary Principle 1896–2000. *Environmental Issue Report* No 22. Copenhagen. Available: [http://reports.eea.eu.int/environmental\\_issue\\_report\\_2001\\_22/en](http://reports.eea.eu.int/environmental_issue_report_2001_22/en)

<sup>99</sup> Loorbach, Derk, and Jan Rotmans. 2004. *Managing Transitions for Sustainable Development*. January. Maastricht: Maastricht University International Center for Integrative Studies (ICIS). Available: [www.icis.nu](http://www.icis.nu)

**Box 3.3: Key Elements of Transition Management**

- Systems thinking encompassing more than one domain and different actors at different scale levels; analyzing how developments in one domain or level gel with developments in other domains or levels; trying to change the strategic orientation of regime actors
- Long-term thinking (at least 25 years) as a framework for shaping short-term policy
- Back- and forecasting: the setting of short- and longer-term goals based on long-term sustainability visions, scenario studies, trend analyses, and short-term possibilities
- Focus on learning and the use of a special learning philosophy of learning-by-doing and doing-by-learning
- Creating policies in terms of performance goals rather than specific means or solutions
- Evaluating policies in terms of both achievement of content goals and improvement in processes of governance and institutional learning
- An orientation toward system innovation and experimentation
- Participation from and interaction between stakeholders

Source: Loorbach, Derk, and Jan Rotmans. 2004. *Managing Transitions for Sustainable Development*. International Center for Integrative Studies (ICIS). Maastricht: Maastricht University. Available: [www.icis.nu](http://www.icis.nu)

Transition management (Box 3.3) differs from the conventional planning-and-implementation model seeking particular outcomes. A more process-oriented and goal-seeking framework helps actors to deal creatively with complexity and uncertainty. Action researchers identify three primary coordination mechanisms:

- market price mechanisms and decentralized decision making for making product and service choices;
- planning in the form of transition goals, policy strategies, and objectives that centrally coordinate economic activities; and
- institutional coordination of developing new models for policy; developing transition arenas, agendas, and goals; fostering new networks; and focusing on learning processes.

The Netherlands Government adopted transition management as a national policy in 2001. This policy is being implemented by five ministries that are developing transition policies for mobility, agriculture, energy supply, and biodiversity. Participants have established transition arenas, which are networks of innovators and visionaries that develop long-term visions to serve as the basis for creating transition agendas and transition experiments. They see this as

a practical means of achieving sustainability benefits in the long term while maintaining short-term diversity.

**Adaptation to Climate Change**

One illustration of planning across time relates to one of the most critical challenges facing the world: responding to the present impacts of climate change and preparing for the likely future impacts. We are already experiencing accelerated melting of glaciers and ice sheets, changes in weather patterns, and the beginning of islands sinking below rising sea levels. An Australian report concludes:

...an adaptation strategy, to be effective, must result in climate risk being considered as a normal part of decision making, allowing governments, businesses and individuals to reflect their risk preferences just as they would for other risk assessments.<sup>100</sup>

<sup>100</sup> Allen Consulting Group. 2005. *Climate Change Risk and Vulnerability: Promoting an Efficient Adaptation Response in Australia*. Report to the Australian Greenhouse Office, Department of the Environment and Heritage. Available: <http://www.greenhouse.gov.au/impacts/publications/pubs/risk-vulnerability.pdf>

Clearly, policy makers will need to work with all of the other dimensions of integrative planning discussed in this chapter, but climate change adaptation presents a new and crucial challenge. A primary level of adaptation will involve integrated planning across regions. Climate change will affect the production and use of water, energy, materials, and land. Interagency and interdisciplinary collaboration will be vitally important (Box 3.4).

Around the world, the dominant response to climate change has been to seek ways to mitigate GHG emissions through policies, financial instruments, energy conservation, and technical means at all levels of an economy. Many of the measures to mitigate GHGs relate to efficient use of energy and adoption of renewable energy and clean energy technologies.



Source: AFP.

As prices for goods and services are adjusted to take account of the global externalities associated with GHG emissions, this will have a powerful effect on resource efficiency.

With a subject as complex as climate change, it is important to consider diverse scenarios of what may happen and determine what short- and mid-term initiatives are the best investments. In California, for instance, rising sea level and shorter retention of water in snow packs is likely to result in greater flooding. Investment in reforestation to retain water,

higher levees along rivers, and constructed wetlands adjacent to rivers are likely to be quite valuable in future years. Dams may need to be raised and strengthened to withstand increased runoff from early snow melt. The PRC's massive floods in recent years suggest similar measures will be required there.

### Box 3.4: Steps in Planning for Climate Adaptation

Some of the basic steps in a regional process to prepare and adapt to the impacts of climate change are:

1. Identify the organization that will act as home base for the process and recruit an initial set of stakeholder organizations from public and private sectors.
2. Develop channels of communication and action to involve people and organizations in the planning and action processes of adaptation. Include a web site, speakers' bureau, town meetings, involvement of schools and colleges, and media briefings.
3. Identify current stresses affecting the region, its natural resources, and economic sectors. This baseline assessment investigates such issues as deforestation, water scarcity, air quality, soil degradation, loss of wetlands, and exhaustion of aquifers.
4. Consider how climate variability and climate change might either amplify or mitigate these stresses, or create new ones. This is basically a scenario planning process based on regional application of climate change models by interdisciplinary teams of experts and stakeholders. Alternative scenarios lay out best-case, middle-case, and worst-case possibilities for all key variables.
5. Identify beneficial strategies that will address the likely impacts of climate change and the current stresses analyzed in step 1. Link these strategies with other important trends, like the transition of sustainable farming, energy and water efficiency, the implementation of renewable energy (especially bioenergy) technologies, and sustainable land-use master plans.
6. Create policies, investment strategies, and action plans in each of the major areas of adaptation to climate change. Identify the early "no-regrets" actions that will pay off, however climate change unfolds.

Source: Ernest Lowe.

Links to reports and websites on climate adaptation planning are available at <http://www.indigodev.com/prepcc.html>