

Sustainable Development Update

– Keeps you updated on the interactions between ecological issues and social and economic development

“The Millennium Ecosystem Assessment will map the health of our planet, and so fill important gaps in the knowledge that we need to preserve it”

Nobel Peace Prizewinner, UN Secretary-General Kofi Annan, 2001.

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“The most critical task facing humanity today is a shared vision of a sustainable and desirable society, one that can provide permanent prosperity within the biophysical constraints of the real world in a way that is fair and equitable to all humanity, to other species, and to future generations”

Robert Costanza, Professor, Institute for Ecological Economics, University of Maryland, USA, 2000

More at:
www.consecol.org/Journal/vol4/iss1/art5/

About S.D.U.

The Sustainable Development Update (SDU) focuses on the links between ecology, society and the economy.

It is produced by Albaeco, an independent non-profit organisation. SDU is produced with support from Sida, the Swedish International Development Cooperation Agency, Environment Policy Division.

We welcome comments, questions, and article ideas.

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Editorial:

Welcome to the first issue!

Sustainable Development Update keeps you updated on the interactions between ecological issues and social and economic development

We have ready access to information about the condition of most nations' economies, educational programs and health care systems. Comparable information on the status and management of ecosystems is often unavailable, despite their importance to social and economic development.

But the situation is changing – development experts now recognise that the capacity of ecosystems to produce goods and services, like food and clean water, is crucial to human well-being and ultimately influences the development potential of nations.

When this ecological capacity is diminished, human societies suffer from effects such as soil erosion, floods and crop failure. Consequently, diminished ecosystem health can have grave implications for human livelihood, food security, conflicts, and even democracy. Often the poor, who depend more directly on forests, fisheries, and agriculture, are most affected.

Biological diversity is the very foundation in this respect. It makes it possible for ecosystems to supply goods and services and respond to disruptions and changes, both natural changes and those caused by human activity.

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

This is not exclusively an ecological, economic, or social issue. It is a combination of all three. Therefore, this newsletter focuses on the latest trans-disciplinary research where ecologists team with social scientists, policymakers and managers to understand how ecological systems that include humans as an essential component really work.

The Sustainable Development Update will also describe the latest insights about how social institutions influence the use and enjoyment of nature's resources and services. Welcome to the first issue!

Dr. Fredrik Moberg, Editor



Aquaculture – sustainable solution for a hungry planet?

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Aquaculture – sustainable solution for a hungry planet?



Tropical coastlines formerly fringed by mangrove forests now converted to shrimp farms. **Photo:** Patrik Rönnbäck

A new report financed by Sida argues that current shrimp farming practice is not sustainable. But less intensive, multi species cultures can reduce waste and improve food supply, employment and income for the poor.

According to a new report “Shrimp Aquaculture – State of the Art” more than two kilograms of wild-caught fish are used in feed to produce one kilogram of shrimp. Current farming practice is therefore not a sustainable solution for a hungry planet. Shrimp aquaculture can also have negative environmental and socio-economic impacts. Yet many bi-

“Shrimp farms are not contributing to global seafood production”



Patrik Rönnbäck.
Photo: Jakob Lundberg

lateral and multi-lateral agencies support modern shrimp aquaculture with large loans, claims author Patrik Rönnbäck. The report reviews the history of shrimp aquaculture, including seldom reported indirect effects on biodiversity and ecological interactions. Rönnbäck also reviews socio-economic aspects such as food security, poverty, livelihood, justice and local involvement.

Social, economic and ecological effects

Direct environmental impacts of shrimp aquaculture include the exploitation of land, consumption of water, seed and feed, and release of excess nutrients and toxic chemicals. Moreover, shrimp from

aquaculture ponds can transfer diseases and parasites to wild stocks, and introduce exotic genetic material into the environment. Aquaculture can also lead to habitat loss and effects on biodiversity and food web interactions.

A well known example described in Rönnbäck’s report is the conversion of mangrove forests to shrimp ponds. Farmers remove mangrove forests at the water’s edge to make room for shrimp ponds. But farmers also lose essential goods and services the mangroves provide their farms, like water quality maintenance and erosion control. In addition, the wild fish and shellfish supported by mangroves are lost.

A calculation in the report shows that an intensive shrimp farm requires a mangrove system at least 22 times larger than the pond itself to take care of nitrogen and phosphorous created by the farm.

Local resource users that collect firewood, honey, fish and shellfish in the mangroves tend to lose this opportunity when mangroves are transformed from a common property into a single-use private resource. Moreover, employment of local people is often limited to low-paying jobs whereas most of the cultured shrimp are exported to luxury markets abroad, claims Rönnbäck.

Sustainable aquaculture

How can shrimp aquaculture become more sustainable and live up to some of the promises of the “Blue Revolution”? Rönnbäck describes two options: (1) small-scale, multi-species, labour-intensive shrimp farms owned by local people, as has been practised for hundreds

of years in some regions, or (2) intensive, “closed” hatchery and grow-out systems that enable the farmer to better control the farming environment. This second option requires high-tech solutions not affordable for poor local farmers.

An international team of scientists presented similar recommendations for the aquaculture industry in the scientific journal *Nature*, attracting considerable media attention. The authors explain how aquacultures that use multiple species can reduce costs and waste while increasing productivity.

Food supply and income for the poor

A report from the Department For International Development (DFID) focuses more explicitly on the socio-economic aspects of aquaculture including the potential of less intensive aquaculture to improve food supply, employment and income for the poor.

These three reports all recommend that governments and donor agencies encourage low-intensity farming of fish species with herbivorous diets instead of promoting the rapid expansion of high-value, carnivorous species like shrimps and salmon. They agree that local people must be employed and eventually become equity holders of aquaculture enterprises instead of being displaced and marginalised.

The poor must be allowed to influence development and participate in policy development for sustainable aquaculture. Rönnbäck concludes that governments should require environmental planning and performance as preconditions to the approval of loans, credits and subsidies. They should also encourage aid agencies and international financial institutions to direct their support towards sustainable coastal seafood production systems.

See also:

“Shrimp Aquaculture – State of the Art”, published by Sida’s EIA Helpdesk, Swedish EIA Centre, Swedish University of Agricultural Sciences, Uppsala.

Available at:
www-mkb.slu.se/mkb/sida/fiske.htm

“Aquaculture, poverty impacts and livelihoods”. Peter Edwards. *Natural Resource Perspectives*, ODI/DFID (Department For International Development), No 56, June 2000.

Available at:
www.odi.org.uk/nrp/index.html

Nature, Vol. 405, 2000, pp. 1017-1024. Naylor, R. and others. Effect of aquaculture on world fish supplies. (Available in an easy-to-read version at: <http://esa.sdsc.edu/issues.htm>)

Want to read more about aquaculture?
See: www.albaeco.com

The Millennium Ecosystem Assessment is a pathbreaking international project. It will provide scientific information on the consequences of ecosystem change for human development. SDU will keep you updated.

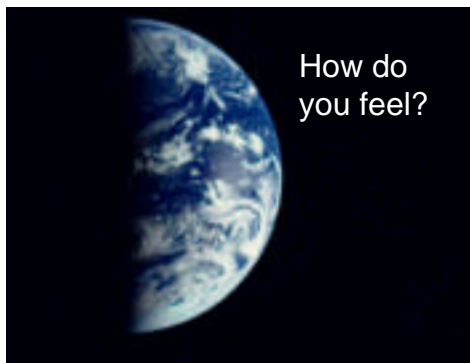
Mother Earth is long overdue for a checkup. In the words of UN Secretary-General Kofi Annan: "The Millennium Ecosystem Assessment will map the health of our planet, and so fill important gaps in the knowledge that we need to preserve it".

The Millennium Ecosystem Assessment (MA for short) launched in April of this year. The \$21 million, four-year effort is a collaboration among an array of government agencies, non-governmental organisations, UN-agencies, leading science organisations, and the private sector.

Focus on human benefits of ecosystems

The MA-study covers ecological, economic and social aspects, focusing on the capacity of ecosystems to provide goods and ecosystem services important to human development.

Ecosystem "goods" include fish, fruits, timber, and medicines. Ecosystem "services" include water and air purification, flood control, erosion control, generation of fertile soils, pollination, as well as aesthetic and cultural benefits. Traditional approaches have tended to focus on a single ecosystem product or



The Millennium Ecosystem Assessment focuses on the socio-economic importance of ecosystems

function (such as fish, timber or hydropower). In doing so, we may be sacrificing goods and services more valuable than those we receive.

Currently, we also tend to focus on single factors influencing ecosystems (for example an invasive species or a specific pollutant). The MA-study will investigate the interactions of several factors and their combined influence on all the goods and services produced by ecosystems. The better we understand the nature of these interactions, the more likely we are to be able to increase the overall output of goods and services from an ecosystem.

Treating the disease, not the symptom

Traditional measures of ecosystem health have included productivity indicators and measures of ecosystem stress. The Millennium Assessment goes deeper, studying the underlying processes necessary for ecosystems to supply goods and services to people. This includes

understanding ecosystems' *resilience*, their capacity to cope with disturbances like storms, fire and pollutants. Most scientists agree that depleting biodiversity will affect nature's resilience and therefore its ability to provide us with goods and services—but we have much to learn about exactly how. Therefore, the Millennium Assessment includes 1 500 leading experts from the natural and social sciences studying the interactions among biodiversity, disturbance and resilience, and how social institutions influence these factors. They will investigate what it takes to manage ecosystems so that they remain resilient and can provide human benefits over the long term.

The Millennium Assessment will give researchers and policymakers better access to global datasets now often available only to the private sector and industrialised country governments.

Another main objective is to support local resource users and strengthen the capacity for local resource management.

World Resources 2000-2001 (World Resources Institute) reports the results of a year-long pilot analysis of the condition of the world's ecosystems. It identified the key ecosystem indicators and data gaps, which laid the groundwork for the Millennium Ecosystem Assessment.

More at:

www.millenniumassessment.org

The report: "World Resources 2000-2001 People and ecosystems: The fraying web of life" can be found at: www.wri.org/wr2000/

Hot links

<http://www.earthtrends.wri.org>

The World Resources Institute's new website "Earthtrends" provides free global environmental and sustainable development information to policy-makers, NGOs, educators, students, and the general public. The information is divided into ten topic areas, including population, health, and human well-being; agriculture and food; economics and business; climate and atmosphere; energy; biodiversity and protected areas; and environmental governance.

<http://www.iisd.ca/wssd/portal.html>

A new web-portal for The World Summit on Sustainable Development upcoming in September 2002 in Johannesburg, South Africa. The World Summit covers global change since the United Nations Conference on Environment and Development in Rio in 1992.

Read about the preparations for the conference, including 16 briefing papers covering topics ranging from poverty, gender and globalisation to climate change.

More at: www.johannesburgsummit.org and www.earthsummit2002.org

SDU-In brief

Global environmental change threatens human development

The "Amsterdam Declaration" claims that global environmental change threatens human development.

Humans are having such a profound effect on the physical environment that the Earth system is beginning to respond, and future environmental changes could be rapid and unpredictable.

Environmental changes are threatening our ability to meet human needs for adequate food, clean water, a healthy environment and safe shelter. "Business-as-usual" is no longer an option. We need deliberate strategies of good management that sustain the environment while meeting social and economic development objectives.

This is the conclusion of a large group of scientists who signed an international declaration in Amsterdam, 10-13 July. The declaration concluded a conference organised by the International Geosphere-

Biosphere Programme (IGBP), the International Human Dimensions Programme on Global Environmental Change (IHDP), the World Climate Research Programme (WCRP) and the international biodiversity programme DIVERSITAS.

The Amsterdam Declaration recognises an urgent need to integrate environment and development issues across disciplines to respond to the challenges of global change. It underscores the fact that climate change, changes in biodiversity, vegetation, land cover and ocean circulation all interact.

The declaration also identifies a need to engage developing country scientists in global change research and discusses which capacity-building measures should receive top priority.

More at:

Download the declaration at: www.sciconf.igbp.kva.se/Amsterdam_Declaration.html

Two leading economists have developed a new welfare index. It shows that some of the poorest countries of the world "developed" by degrading their natural environment.

In a recent article Partha Dasgupta and Karl-Göran Mäler develop a new measure of welfare that they call *wealth*. Some countries that seem to be performing well when looking at GNP or the United Nations' Human Development Index have in fact become poorer, according to the new welfare index.

For example, the Indian sub-continent and sub-Saharan Africa, two of the world's poorest regions, are now poorer than they were thirty years ago. In 1993, the average Pakistani was almost twice as poor as he was in 1965, although per capita GNP doubled during that same period. In fact, argue Dasgupta and Mäler, the Human Development Index (HDI) is often more misleading than the GNP.

The GNP is more a measure of aggregate economic activity than of social well-being. The HDI is, in practice, based on three attributes: life expectancy at birth, GNP per capita, and adult literacy. Both indices mainly measure current well-being, and do not reflect whether or not economic development is sustainable.

By contrast, the new welfare index suggested by Dasgupta and Mäler includes not only the social value of manufactured capital, but also human and natural capital. Natural capital includes commercial forests, oil and minerals, and the damage caused by the release of carbon dioxide. In this respect the new index is based on a measure called genuine savings by economists.

Many other human benefits of natural ecosystems are not included in the Dasgupta/Mäler index, such as water resources, fisheries, water and air purification, flood control, erosion control, generation of fertile soils, and pollination. Nevertheless, including even a few components of natural capital leads to findings substantially different from those of most contemporary economic development literature.

As a consequence, the new index can change our perception of the development process, especially as we attempt to find solutions to the problems of poor countries.

Source:

Wealth as a Criterion for Sustainable Development. Discussion Paper 139, The Beijer International Institute of Ecological Economics. Dasgupta, P., Mäler, K-G. Available at: www.beijer.kva.se/publications/pdf-archive/Disc139.pdf

Less centralised and flexible management of natural resources

Students of policy analysis are often taught an overly simplified and static style of natural resource management, says Elinor Ostrom, Professor of Political Science at Indiana University, USA. In a new article she explains how we can learn how to manage natural resources the way engineers design airplanes, and the way the human immune system protects us from infections.

Engineers are trained to design airplanes that can withstand heavy use and respond to unexpected circumstances such as extreme weather conditions and accidents. This is accomplished by building in redundancy. A Boeing 777, for example, has 150 000 distinct subsystems, and the human immune system has a large number of seemingly redundant systems that protect us from the multitude of different infectious agents we are exposed to.

This is also how we should deal with the various aspects of global environmental change, claims Ostrom;

the world is complex and rapidly changing, so we need more flexible, "polycentric" governance systems. Polycentric governance is management shared by many different democratic subunits of various sizes and scales, from national governments to local villages. Subunits are allowed to experiment with different kinds of rules. Citizens and officials have access to local knowledge, obtain rapid feedback, and can learn from the experiences of parallel units.

If there is only one governance unit for a very large geographic area, the area is very vulnerable to external environmental threats. This can be avoided in an area with multiple governance units organised at different levels, says Ostrom. The failure of one or more of these units to respond can lead to small-scale disasters that can be compensated by the successful reaction of other units in the area.

Source:

IHDP Update, Newsletter of the International Human Dimensions Programme on Global Environmental Change, Number 3/01. www.uni-bonn.de/ihdp/IHDPupdate0103/index.htm

Cost of saving biodiversity less than the individual wealth of world's richest

Protecting enough biological diversity to maintain a healthy planet will cost about \$30 billion, according to a recent *Science* article. This cost is 1/1000th of the estimated economic value of the human benefits that biodiversity provides annually. It's also less than the individual wealth of the world's richest citizens.

Most of the cost (\$25 billion) is required to protect the world's 25 "biodiversity hotspots", representing just 1.4 percent of the world's landmass, but containing about 60 percent of land species diversity. At present, conservation research and management are highly centralized in industrialized nations. Therefore, roughly half a billion dollars would support capacity-building in 25 centers, mainly in tropical developing countries.

Source:

Science, Vol. 293, 21 September 2001. "Can we defy nature's end?" Stuart L. Pimm and 32 co-authors. www.sciencemag.org

The poor exposed to the worst environmental and health risks

– An explicit focus on the link between health and environment is crucial for poverty alleviation, says Ewa Nunes Sörenson of Sida's Health Division to Sustainable Development Update.

This is also reflected in the Health Division's new issue paper, compiled by Marianne Kjellén at the Stockholm Environment Institute (SEI). Kjellén addresses environment and health issues with an explicit poverty perspective. She concludes that improvements to the environment and health help alleviate poverty and enhance well-being. Therefore, positive spirals can be initiated if the link between health and the environment is considered when designing policy and development initiatives.

The issue paper considers several health-environment connections, ranging from the home and work environment of poor people to effects on the broader environment due to climate change. For example, a lack of protective measures and low levels of literacy among poor people applying pesticides often leads to acute poisoning.

Climate change can influence human health by affecting the frequency and severity of storms, floods and heat waves. But the effects can also be mediated through subtle changes in ecological interactions. For example, insects transmitting malaria and dengue ("breakbone") fever seem to be affected by climate change. These diseases are now spreading into mountain areas in Africa, Asia and Latin America where temperature formerly restricted insects and insect-borne diseases.

In addition, yellow fever, cholera and rodent-borne viruses are also appearing with increased frequency. The altered transmission of these diseases, spread by animals or water, reflects both an environmental and a social change.

See also:

Issue paper on: Health and Environment. Health Division Document 2001:1. Prepared by Marianne Kjellén for Department for Democracy and Social Development, Health Division, Sida.

Epstein P. "Emerging diseases in a warmer world". www.peopleandplanet.net/doc.php?id=104