Sustainable Development Update

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The forgotten phosphorus crisis

Global food security depends heavily upon the availability of fertilisers made of phosphate rock. But the global reserves of cheap phosphorus might be depleted within 60-80 years at present rates of extraction. This imminent crisis can create major problems and challenges for global food production. The highly skewed geographic distribution of the reserves will further complicate things, experts warn.

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The benefits of multi-species aquaculture

A recent publication offers profitable solutions for environmentally sound multi-species marine aquaculture.

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Unique Madagascan forest returns thanks to unofficial landowner agreements.

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"There is considerable economic potential for the mitigation of global greenhouse gas emissions over the coming decades, that could offset the projected growth of global emissions or reduce emissions below current levels."

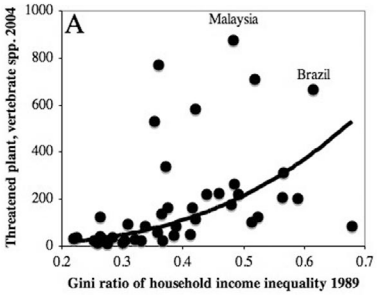
The third part of the "Fourth Assessment Report" from the Intergovernmental Panel on Climate Change (IPCC).

http://www.ipcc.ch

Economic inequality leads to biodiversity loss

Want to save the world's plant and animal diversity? Start by sharing the economic resources more fairly, say a group of Canadian researchers.

When loggers in Mexico cut down trees to make way for cattle ranches, the impact on the forest is more driven by the highly uneven distribution of wealth than previously thought. This follows from a new study by a group of Canadian researchers that have looked into the connection between economic inequality and the number of plant and animal species that are threatened with extinction. Conclusion: societies with more unequal distributions of income experience greater losses of biodiversity. A 1% increase in inequality was associated with a nearly 2% in the number of threatened species.



The relationship between inequality and number of threatened species. 0 on the x-axis means everyone having the same income and 1 total inequality.

– If we can learn to share economic resources more fairly with fellow members of our own species, it may help us to share ecological resources more fairly with our fellow species, says Greg Mikkelson from McGill University in Montreal.

Mikkelson and his colleagues compared indicators of income inequality and biodiversity loss among 45 countries worldwide, and among 45 states within the United States. They controlled for differences such as area and climate, human population size, and per capita consumption.

The pattern they found suggests, for example, that if the US were to achieve levels of income equality comparable to those of Sweden, that 44% fewer plant and vertebrate species in the US would be in danger of extinction.

– In the past, people thought that human population size was the main driver of biodiversity loss, then people showed that the size of the economy provided a better explanation, says co-author Garry Peterson, also from McGill University.

Linking natural science to social causes

While previous research has linked income inequality and public health, the link between socioeconomic factors and the decline of biodiversity has not been as well studied, say the researchers behind the new study. Hence, we must link the natural science of biodiversity loss to the social causes if we want to save the world's plant and animal diversity.

/Fredrik Moberg

More at:
http://www.plosone.org

SDU contents, Issue 2, Volume 7, 2007:

editorial

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Will the world turn into a brighter place just because I switch to energy-saving light bulbs?

Many might end up with a nagging feeling that climate change is too big of a problem to solve. This is of course the reason why so many now present lists of things we all can do in our everyday lives to make a difference. And small changes can without a doubt make big difference. One recent example is the findings that if all traditional light bulbs sold in Europe were to be replaced with more efficient compact fluorescent lamps the continent would need 27 fewer power plants. As most power plants are fuelled by fossil fuels, like oil and coal, this would entail decreased emissions of carbon dioxide. I'm fine with that. But I certainly don't think that the world will automatically turn into a brighter place just because I switch to energy-saving light bulbs.

Likewise, everyday I walk by a number of billboards telling me that I can save the planet if I pump up the tires on my car. If I only had a car. What a big difference I could make. If all car owners in my home town followed this advice we could actually save 20 million litres of gas and decrease our emissions by 47 000 tonnes of carbon dioxide annually, according to the city council. Along the same line I recently heard of a friend of a friend who bragged about owning two hybrid cars. Would it have been even better for the environment if she had three of them? No, I'm not against cars per se. Just want to use the car-example to elucidate how most of these 'Ten Things You Can Do To Save The Planet'-lists avoid the crucial question of overall consumption rates. Few question how important it is for us in developed countries to be more efficient in energy and resource use. In particular if we consider the fact that two-thirds of the human-released carbon dioxide in the atmosphere comes from the United States and Western Europe, whereas it is the poor countries of the South that will suffer the most from hunger, floods and water shortages. But the truth is that, so far, the efficiency gains in the rich countries have largely been eaten up by ever growing consumption of gadgets and increased travelling. Unlimited mobility and consumption might simply not be possible in a sustainable society.

So, the new trend is eco-efficiency accompanied by "eco-sufficiency". Eco-sufficiency asks what is an "acceptable" level of consumption and calls for a reduction of the level of production and consumption in the rich parts of the world that has about 20 percent of the world's population but consume some 80 percent of its natural resources. The idea of eco-sufficiency also stems from a growing realisation of the very weak relationship in rich countries between material wealth, measured as GDP, and true human well-being. While eco-efficiency could mean producing a car that uses 4 litres rather than 9 litres of gasoline per 100 kilometres, eco-sufficiency can mean going by train instead or travelling less far or less frequently. The message is: Consume less, work less and live more! As such eco-sufficiency is closely related to issues of quality-of-life and life-work-balance, meaning for example that by consuming less you can work less and get more time with your family and friends. This thinking is also based on the notion that there's a link between the fact that we

"So far, the efficiency gains in the rich countries have largely been eaten up by ever growing consumption of gadgets and increased travelling"

burn out both people and ecosystems: the current "Western" lifestyle. However, producers also bear responsibility; they can not hide behind the demands of the consumers. The latter of course have real needs (like an adequate diet, safe water and proper sanitation), but also temptations – which the producers are also responsible for creating through advertising.

So, in reality the world will not automatically turn into a brighter place just because everyone buys compact fluorescent light bulbs or pumps up their tires. The individual consumers can indeed contribute, but there is also a risk of a backlash if the dominant narrative continues to be that we as individuals are responsible and have to make changes or we're all going to die. People faced with an overwhelming threat that don't see a solution tend to shrug it off or simply go into deliberate denial. Tackling climate change is not only up to individual consumer choices. The rising global thermometer must also translate into real changes of the political climate that stimulate fair and sustainable production and consumption patterns. A change like that would have a real potential to light up my day.

/Dr. Fredrik Moberg, Editor

Sustainability School: "Political ecology"

Political Ecology can be seen as an umbrella term for all the interdisciplinary work that deals with the politics of the environment and seeks "to explore the connections between poverty and wealth, environmental degradation and the political process" (Bryant and Bailey, 1997). So far, a lot of the work has dealt with conflicts over the environment between: North and South, TNCs (Trans-National Corporations) and grassroots, and rich and poor.

When Vanity Fair releases "carbon neutral" issues and the Swedish prime minister Reinfeldt flies off to "sustainababble" with president Bush about the climate change, it could be a seen as a sign of hope. That there is a capacity in our societies to cope with the challenges of sustainability. The scientific discipline political ecology does not think so. According to them there can be little improvements in the world, before the capitalist system has radically changed or disappeared.

Sustainababble is a word that Alf Hornborg, one of the most well-known Swedish Political Ecologists, uses when he talks about the international community that are so good at "talking the talk, without walking the walk". How else could you explain that the economic inequality in the world is growing when the visions of fighting poverty and ending world hunger have been around since the 1970s? He, as all political ecologists, is fiercely critical to the idea that capitalism is of benefit to everyone, rather than to a few.

Despite – or because of – its controversial content political ecology has grown rapidly during the ten years that it has existed. Today you find the expression in scientific journals as well as in policy documents, like the recent SIDA report "Of Global Concern – Rural Livelihood Dynamics and Natural Resource Governance" (SIDA Studies No.16).

Criticism and appraisal

It is hard to generalize about an interdisciplinary, broad and quite radical discipline, because there will always be many exceptions. Having said this, two criticisms that have come up in regard to political ecology are firstly, that even though it claims to be concerned with the environment it tends to treat it as a commodity, a black box – ignoring the core challenge of sustainability, namely that whoever has power of it (be it grassroots or a corporation) needs to find a good way to manage it successfully. Secondly, political ecology has been accused of always criticizing, without offering any solutions, but "radical change".

Alf Hornborg rejects this criticism saying that "this is tragic, as it should be quite feasible to arrive at a correct analysis of a problem without (yet) having developed a good solution." Whether one shares the political ecology world-view or not, an important point is made. Namely that it is high time to walk the talk.

/Jacob von Heland

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Bryant, RL, and Bailey, S. 1997. Third World Political Ecology. Routledge London.

http://www.sida.se/shared/jsp/download.jsp?f=SIDA26102en_Sida_Studies16.pdf&a=21102

The imminent phosphorus crisis threatens future food security around the world

Global food security depends heavily upon the availability of fertilisers made of phosphate rock. But the global reserves of cheap phosphorus might be depleted within 60-80 years at present rates of extraction. This imminent crisis can create major problems and challenges for human development on a global scale, experts warn.

Phosphorus used to produce fertilisers for growing the food we eat is dwindling. Farmers in Tanzania, Africa. Photo: Robert Kautsky/azote.se

Phosphorus is an essential element for all life. It plays a major role in the membranes of all living cells and in molecules like DNA and RNA, which contain the genetic instructions for all living organisms. Phosphorus is also used in a variety of products, such as safety matches, fireworks, pesticides, soft drinks and fluorescent light bulbs. Finally – and perhaps most important – phosphorus is used to produce fertilisers essential for growing the food we eat. But few people know that this limited non-renewable resource is now showing signs of dwindling. This might well become a determining factor in human development on a global scale,

"The global reserves of 'cheap' phosphorus will be depleted within 60-80 years"

experts warn. What is alarming is the little concern being shown by leaders of the world.

– The geopolitics of phosphorus has not been properly enunciated and no political attention has been given to this question yet. The global reserves of "cheap" phosphorus will be depleted within 60-80 years at present rates of extraction. The highly skewed geographic distribution of the reserves will further complicate things and global shortages and increased prices may become commonplace within the next couple of decades, says Arno Rosemarin, researcher at Stockholm Environment Institute, Sweden.

Arno Rosemarin

A dwindling resource

A majority of countries already depend on imported phosphorus for agriculture. This is due to the fact that most agricultural practices use essential nutrients, such as phosphorus, nitrogen and potassium, more rapidly than they are replenished by natural soil formation processes. When farmers harvest their fields these nutrients are also removed and, in the western world, we tend to apply mineral fertilisers of fossil origin in order to replace these lost nutrients. Unfortunately, the reserves of phosphorus and potassium are decreasing in the world and production of nitrogen fertilisers requires fossil energy. Many chemical fertilisers also contain high levels of heavy metals like cadmium (that can damage the kidneys and cause bone, nerve and immune system disorders). While nitrogen fertilizer is produced in an energy-consuming process from atmospheric nitrogen, potassium fertiliser is derived from geological deposits and phosphorus from mainly fossil rocksediments containing phosphate.

The costs for phosphorous extraction are projected to grow when countries rich in deposits become aware of the scarcity value, and due to higher processing costs as the phosphate content of the ores continues to go down. Moreover, the degree of impurities will probably slowly increase when the quality reserves are exhausted, with further increases in processing costs as a consequence. With the high prices of phosphate, poor countries may be forced to practice large-scale and continuous slash and burn methods to regenerate phosphate from surface soils creating significant regional air pollution.

The new oil crisis?

The imminent phosphorous crisis resembles the oil crisis of the 1970s, but there is one major difference: there is no known substitute for phosphorous. With 70% of the reserves found in Morocco/West Sahara (the last existing colony in Africa) and China, the world is increasingly dependent on smaller and smaller reserves from politically unstable countries. A new OPEC (Organisation for Phosphate Exporting Countries) to steer phosphate exports from e.g. West Africa is something we may witness within the near future. Hence, future armed struggles, similar to the ones over oil, are not at all impossible to envision.

The downside of phosphate mining

Another issue is of course the social and environmental effects of mining in the countries with the larger deposits. The mining of phosphate on the island of Nauru in the Pacific Ocean is one well-known example of a boom and bust economy. Here mining has devastated the vegetation and soil and created financial, legal, and cultural problems. Phosphate is the primary basis for the economy, and today the phosphate has been exhausted, and mining has virtually ceased. As such, the government of Nauru is looking into

"Future armed struggles, similar to the ones over oil, are not at all impossible to envision"

the question of responsibility for the environmental degradation on the island, and is looking into ways to rehabilitate the island. Likewise, at Banaba Island, a coral island 300 km east of Nauru, phosphate-mining stripped away 90% of the island's surface.

The African country Togo is another example. Already in 1998 Kurt Grimm of the University of British Columbia focused on Togo and warned about the dangers of neglecting the possible impact of declining phosphate resources on global food security:

What considerations must be made for the poor of Togo, whose mines supply most the phosphate rock that fills our bellies and agribusiness bank accounts? Will we and our children witness the emergence of a "new world order", where the volume and affordability of regional and global food production is highly vulnerable to manipulation by selfish interests? Are transnational corporations, governments, NGOs and the remaining public sector adequately informed about the geology, economics

Continues>>

and geopolitics of phosphorite resources? /.../ One conclusion is clear: the intricate and society-relevant issue of declining phosphorite resources warrants further interdisciplinary research, to complement broad, inclusive, and proactive discussion in the public domain.

In the wrong place

Feeding the world's growing population is projected to increase agriculture's future share in the use of phosphate. This will in turn lead to increasingly dwindling reserves of cheap and easily extracted phosphorus. Unfortunately, too little phosphorous is recycled in urban areas as well as from agricultural land. Therefore, excess runoff and discharge of phosphorous in surface waters have resulted in eutrophication and algal overgrowth, which creates oxygen-poor conditions, reduces water quality and damages ecosystems. This insufficient recycling of essential nutrients has also made us highly dependent on expansive extraction of limited supplies. Most countries are already dependent on import of phosphorus for agriculture and as the reserves dwindle food prices around the world will be affected, says Arno Rosemarin:

– The US which at present is extracting more than any country has only 5-6% of the world reserve. Within 30 years the viable reserves in the US will be exhausted. Further extraction of offshore and other presently uneconomic reserves in the US will cost much more than today and this will have major repercussions on food prices.

Recycling of phosphorus

One solution to the phosphorus problem that has been put forward is "ecological sanitation", or EcoSan. It is promoted as a means of securing food supplies and proponents say it is a cheap, water efficient and non-polluting method to recycle phosphorus and other essential nutrients. On average a person produces 35 to 50 kg of faeces and 500 litres of urine per year, and this "waste" contains most of the nitrogen, phosphorus and potassium consumed from food. This is why EcoSan proponents talk about "closing the loop" and start recycling the nutrients from human excreta and solid waste for use in agriculture again. In this respect, the use of urine, composted human manure and household organics can entail increased crop yields and help alleviate poverty and malnutrition of poor farmers unable to afford commercial fertilisers. The composted faeces act as a soil conditioner, which increases water-holding capacity, improves soil structure and releases nutrients at the rate plants need them.

/Fredrik Moberg

More at:
A more detailed assessment of the phosphorus issue can be found in "Down to Earth" of the Centre for Science and Environment, Delhi: http://www.downtoearth.org.in/default20040630.htm

Photo elicitation: How photography can contribute to community based resource management

The idea that "a picture is worth a thousand words" has been taken one step further by Ruth Beilin, landscape sociologist at Melbourne University. She uses photography as a way to remove some of the barriers between the researcher and the researched. We asked her three questions about the technique known as "photo elicitation".


Ruth Beilin

1. What is photo elicitation?

"In photo-elicitation the photograph becomes part of the interview process. Anthropologists have traditionally taken the photograph and then asked the local informants to explain what is going on in the image. In the 1980s this method was used to understand Navejo Indian life on American western reservations. The photograph itself acts as the question and the informant and the researcher interrogate the image. I started to use photo elicitation in my work in community based resource management with Landcare farmers in Australia. The highly participatory nature of the groups and the research meant that the cameras were also handed over to the informants and they decided which images to photograph and discuss as part of the research process."

2. Why is this method important?

"Because a farmer, a naturalist, a land developer, an archaeologist would all look at a rural landscape from a different perspective and interpret what they see differently. It is usual for these different viewpoints to seem incommensurable and often people defend these positions without really understanding why they are important to maintain. Photo elicitation assists communities and individuals to identify closed held values and for participants to work through these ideas in a way that facilitates discussion, transparency and understanding."

3. How is participatory photo elicitation done?

"Communities can use this method as individuals or in groups to bring forward key ideas about land and resource management. As an initial step in my own research I do a 'life and landscape history' interview with the informants.

A disposable camera is left with the informants and they are asked to take 12 images to describe the most significant aspects of their land management or resource use. They are asked to mark the location of each photograph on a map and send this to the researcher as well.

The researcher returns with the processed photographs for another interview. At this interview aspects of personal construct theory are used to help sort through the meaning and importance of the 12 images. This is done by asking the photographer to group and rank the photos within each group according to their importance for the farmer. Then the researcher interrogates why the photographer has ordered the photograph in this way and uses the responses to probe deeply held values about what is both visible in the image and invisible but connected to it in the mind of the land manager.

After the interview with the photographs, the photographer is asked to accompany the researcher to each site, so what is not inside the frame of the photograph can also be understood and discussed.

/Jacob von Heland

For more info:

Beilin, R. 2005. Photo elicitation and the agricultural landscape: 'seeing' and 'telling' about farming, community and place in a world of changing expectations about practice. Visual Studies 20 (1): 56-69.

Ruth Beilin's website:
www.landfood.unimelb.edu.au/research/social/landscape/staff.html

Multi-species aquaculture key to sustainable seafood supply

Worldwide demand for seafood will double within a few decades. Meanwhile, capture fishery production is declining due to overexploitation and habitat loss. This opens up a huge potential for marine aquaculture, but its sustainability has been questioned. A recent publication offers new hope: profitable solutions for environmentally sound multi-species marine aquaculture.

Global trade in seafood is currently valued at $78 billion a year, with the majority of supply originating in the developing world. Meanwhile, aquaculture is the world's fastest growing food producing sector supplying 38% of all consumed fish and seafood. Approximately one third of this production takes place in the marine environment. Independent of limited freshwater resources, marine aquaculture, mariculture, has the greatest potential to expand. Although seaweed and shellfish dominate the mariculture sector, finfish farming has received most attention.

The rapid increase in industrialized monocultures of finfish and shrimps, denominated the 'blue revolution', has been widely debated and its sustainability repeatedly questioned in recent years. Not only do carnivorous fish demand protein feed, which is commonly extracted from fisheries. The critics also claim that this extraction is reducing the supply of low cost fish protein for human consumption in impoverished communities of the developing world. In addition, waste from fish and shrimp farms poses a serious hazard, contributing to eutrophication (nutrient overload) and pollution of adjacent ecosystems.

Some argue that the prosperity of industries such as the salmon and shrimp farming is in part due to lack of economic responsibility for its negative environmental impacts. A 'polluters pay' policy, as suggested by Amir Neori and his colleagues in the latest issue of Environment, would force producers to reconsider current practises and look for new solutions.


Photo: azote.se

The 'mini-biosphere' approach

The key to the waste problem is simple and yet elegant: farm more than one single species and recycle like Mother Nature. Seaweed and shellfish currently make up 90% of the farmed marine production. The potential of these organisms to remove nutrients from waste feed and feces, while being economically valuable in themselves, is significant. Hence, combining the farming of carnivores with the farming of algae and edible shellfish could benefit both business and the environment while maintaining ecological integrity. The next step would be to reduce the dependency of wild caught fish protein for feed. Ultimately, Neori and co-workers argue, the farming of organisms at different trophic levels (called integrated multi-trophic aquaculture, IMTA) could become a self-sufficient 'mini-biosphere', providing maximum yield with minimum impact.

/Kajsa Garpe

Source:

Neori A and others. 2007. The need for balanced ecosystem approach to blue revolution aquaculture. Environment, 49 (3) pp 36-43.

Unique tropical Madagascan forests return thanks to better forest management and unofficial land ownership agreements

Large areas of the unique Madagascan dry forest are now recovering. This is shown by a group of Swedish and Madagascan researchers that were surprised to find that the areas suffering most from deforestation had the lowest population density and were far from markets.


Photo: Jakob Lundberg

Although loss of the Madagascan dry forests do occur, there are areas of forests regenerating. A team of scientists from Sweden and Madagascar found the return of forest cover to be substantial in their study area, with an overall net increase of 4 % during the period 1993-2000. These dry forests have the highest level of endemic plant species (species found only in a particular region) in all of Madagascar and are listed as one of the 200 most important "ecoregions" of the world. The study, based on analyses of satellite images and vegetation on the ground, also showed that the relationship between human population density and deforestation is much more complex than previously thought.

– We were surprised to find the highest deforestation rates in an area with low human population density and large distance to markets, says the lead author of the new study, Thomas Elmqvist, Professor at the Stockholm Resilience Centre, Sweden.

The researchers also made interviews with local forest officials and villagers. This revealed that loss of forest occurred mainly in areas with insecure property rights, while areas with well-defined local norms, rules and property rights for forest management showed either regenerating or stable forest cover.

– Regeneration of tropical forests has so far mostly been studied by ecologists trying to understand factors like seed dispersal and soil quality, our study clearly shows the importance of an increased understanding also of the social context behind forest regeneration, says Thomas Elmqvist.

Understanding the social context

The loss of tropical forests is a concern worldwide since these forests harbor more than 50 % of the terrestrial species richness in the world and play a large role in global climate regulation. Estimates of tropical forest loss are still uncertain and a 50 % margin of error appears possible. However, scientists know even less about regeneration of tropical forests.

– We now know a fair amount about the human social context in which tropical forest loss is embedded, but very little is known about the role of social institutions in influencing regeneration of tropical forests, says Maria Tengö from Stockholm University, another of the authors behind the recent article in PlosOne.

The new study points to the large capacity of dry tropical forests to spontaneously regenerate if existing local rules and norms (including well-defined property rights) mitigate other drivers of deforestation and alternative land-use.

/Fredrik Moberg

More at:

http://environment.newscientist.com/article/dn11771-madagascan-forests-regenerate-against-expectations.html

Goldman Prize: 'Nobel environment prize' for curbing wildlife poaching and empowering women in Zambia

Rampant poaching in Zambia's North Luangwa Valley had extirpated wild elephant populations and left communities living in extreme poverty. However, innovative strategies for community development have not only restored the regional wildlife but also provided new pathways toward a more sustainable socio-economic development.

Leading the project that forms the backbone of this transition is Hammerskjoeld Simwinga, named after the former Swedish UN secretary general Dag Hammarskjöld. Simwinga is one of this year's recipients of the Goldman Prize, often referred to as the "Nobel prize for the environment". His enduring activism in the Luangwa Valley during the past decade has revolved around a simple notion; the best way to get local communities to switch from poaching is not strict excluding legislations, but the provision of alternative livelihood strategies.

The program began in 1994 helping villagers form "wildlife clubs" that provided micro-loans to stimulate legal jobs as alternatives to working for the poachers. Seed loans, transportation and technical assistance was provided farmers in order to improve yields so they did not have to depend on meat from wild animals. Simwinga tied the entire project to protection of the wildlife, thus substituting an illicit economy based on poaching with a legal one.

Women in focus

The project also maintains an active women's empowerment approach, with over 70% of the loan activities going to women.

– We deliberately pushed our resources to the womenfolk in the community because we knew that working with the women

Goldman Prize-winner Hammerskjoeld Simwinga in a sunflower field near his home. Photo by John Antonelli.

was the strongest part of persuasion. As we continued empowering the women their economies in their households became more visible and more people started looking at these households prospering, Simwinga says himself.

Simwinga's tireless efforts have led to a dramatic transformation of the region. 64 villages comprising some 35,000 people are now taking part, and prosperity is booming, poaching has dwindled, wildlife is returning and with it the tourists.

The Goldman Environmental Prize was established in 1990 by Richard N. Goldman and his late wife, Rhoda H. Goldman. It has now been awarded to 119 people from 70 countries.

/Albert Norström

More at:
http://www.goldmanprize.org

The rights of poor fishermen need to be strengthened, says FAO

Sustainable management of fisheries is hampered by prevailing socio-economic conditions and the lack of clear leagal access to fishing grounds, says the FAO.

The paradox of why fishing communities in developing countries are often characterized by poverty and vulnerability, despite the food and income fishing can provide, was a focal point of the recent 27th meeting of FAO's Committee on Fisheries (5-9 March 2007). Apart from the human suffering it causes, poverty in coastal communities is a spanner in the works for sustainably managing threatened marine resources, such as declining fish stocks. Stronger efforts to deal with education, income, and health issues in fishing communities would not only help fight poverty and social problems, according to FAO, but would have the additional benefit of making it easier for them to solve their fishery-related ones. At the same time, granting small-scale fisheries clear legal access to fishing grounds and giving them greater responsibility in managing local fisheries would directly help deal with the problems of poor management and stock degradation.

/Albert Norström

More at
www.fao.org/newsroom/en/news/2007/1000544/index.html

SDU-numbers

250 …million people in Africa could be facing water shortages by the year 2020 as a result of global warming, and the output of rain-fed agriculture could fall by 50 per cent during the same period. This was one of the conclusions when the UN Intergovernmental Panel on Climate Change (IPCC) released its report on impacts, adaptation and vulnerability earlier this spring. The report also indicates that developed countries aren't spending enough to limit the effects of climate change on developing countries. Whereas two-thirds of the human-released carbon dioxide in the atmosphere comes from the United States and Western Europe it is the poor countries of the South that will suffer the most from hunger, floods and water shortages.

– It is the poorest of the poor in the world, and this includes poor people even in prosperous societies, who are going to be the worst hit, says IPCC Chairman Rajendra Pachauri.

The combined effect of climate change and land use change, pollution, and over-exploitation of species is projected to lead to major changes in ecosystem function, species' ecological interactions, and species' geographic ranges, with predominantly negative consequences for biodiversity, and ecosystem goods and services e.g., water and food supply. In spite of this, the report points out, only tens of millions of dollars have been provided to vulnerable countries close to the equator, whereas the developed nations spend billions to limit the risks in their own countries.

http://www.ipcc.ch

Sida

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