



UNITED NATIONS  
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## UNU Report

Making Integrated Solutions Work for

# Sustainable Development

FINAL REPORT

Johannesburg Summit 2002



**Making Integrated Solutions Work for**  
**Sustainable Development**

UNU Report to the  
World Summit on Sustainable Development

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## Contents

<b>Message from the Rector of UNU</b>	<b>2</b>
<b>Executive Summary</b>	<b>3</b>
<b>Introduction</b>	<b>4</b>
<b>UNU Results on Issues Concerning the WSSD Draft Plan of Implementation</b>	<b>8</b>
Poverty Eradication	8
Protecting and Managing the Natural Resource Base of Economic and Social development	11
Unsustainable Consumption and Production Patterns	20
Globalisation and Sustainable Development	21
Health	22
Means of Implementation	26
Institutional Framework for Sustainable Development	31
<b>UNU Partnerships and Activities to Implement Agenda 21</b>	<b>38</b>
WSSD Type II Partnerships	38
Existing UNU Partnerships and Capacity Development Programme	39

*"The Johannesburg World Summit on Sustainable Development has the potential to serve as a turning point in the way that the international community pursues the goal of sustainable human development. The obvious decline in the condition of the natural environment combined with extreme poverty still prevailing in many parts of the world and access to clean drinking water, basic health services or education still illusory for many, have generated a worldwide appreciation of the urgency with which we prepare for the WSSD. This reality points to the core consideration that the goals of sustainable development must be more effectively mainstreamed within the broader global political agenda. This is why the Johannesburg World Summit on Sustainable Development is so crucial.*

*The Johannesburg Summit MUST signal a new, global level, appreciation of the need to approach sus-tainable development in a more comprehensive, strategic and integrated manner. Attention must also be directed at both human and environmental resources. Our work, which we proudly present here, tries to contribute to these common goals."*

*Hans van Ginkel  
Rector  
United Nations University*

## Executive Summary

As the 'think tank' of the United Nations and a builder of capacities in developing nations, United Nations University is committed to global efforts to promote sustainable development. This report is the fifth and final contribution to the WSSD process. The first four were entitled:

- *Breaking Down Barriers to Sustainable Development in Asia and the Pacific*, submitted to the Regional PrepCom for Asia and the Pacific, Phnom Penh, Cambodia, November 2001.
- *Effective Pathways to Sustainable Development*, submitted to the Second Global PrepCom, New York, January 2002.
- *International Environmental Governance: The Question of Reform—Key Issues and Proposals*, submitted to the Third Global PrepCom, New York, March 2002.
- *Improving the Management of Sustainable Development: Towards a New Strategic Framework for Large Developing Countries—China, India, and Indonesia*, submitted to the Fourth Global PrepCom, Bali, August 2002.

Since the 1992 UN Conference on Environment and Development, efforts to promote sustainable development have increased in number and scope. At the same time, these efforts have become increasingly fragmented. The complex nature of the problems of sustainable development, and the challenge of achieving balance between its social, economic and environmental pillars require integrated, multi-faceted solutions. United Nations University (UNU) offers this report in an effort to inform those solutions. Here, UNU shares the findings of its research on the issues presented in the Draft Plan of Implementation.

Given the close relationship between poverty and environmental degradation, poverty eradication is the first step toward sustainable development. In the first section, the report discusses the relationship between poverty and other issues such as conflict, gender inequality, access to clean water and urbanisation.

The second portion of the report examines those issues related to the

protection and management of the natural resource base necessary for economic and social development. Recommendations about combating desertification, preserving biodiversity and the environmental integrity of mountains, forests and oceans and coastal communities and their ecosystems are found within this section. The reader will also find a discussion of natural resources in Africa, and the impact of natural disasters.

The third and fourth sections examine issues of sustainability in production, consumption and trade. The fifth takes up two critical issues highlighted by the UN Secretary-General—water and health—and the relationship between the two. The following section about implementation, discusses ways in which the issues presented in the first half of the report can be addressed through more efficient and adequate levels of funding, the development of environmentally-friendly technologies, a commitment to higher education, and innovations at the community level.

The report then turns to an examination of the international institutional framework that governs sustainable development. This section offers a number of ways to increase the effectiveness of and coordination between organisations charged with environmental protection and promoting sustainable development.

The final section of the report outlines UNU partnerships and activities to implement *Agenda 21*. These include post-secondary education, capacity development and training in diverse areas such as fisheries management, software technology and leadership training. The final section also outlines the Type II Partnerships that UNU will launch at WSSD:

- Type II Partnership on Mobilising the New Social Contract on Science and Technology for Sustainable Development: The UNU/IAS Higher Education Fellowship Initiative on Science and Sustainability
- Type II International Partnership for Sustainable Development in Mountain Regions
- Type II Partnership on Inter-linkages between Multilateral Environmental Agreements (MEAs)

## Introduction

Thirty years ago, the United Nations Conference on the Human Environment (UNCHE) issued a challenge to the international community: “to defend and improve the human environment for present and future generations”. United Nations University was established shortly thereafter to tackle that challenge. By bringing together the academic and policy spheres, United Nations University (UNU) was founded “to contribute, through research and capacity development, to efforts to resolve the pressing global problems”. Since then, UNU has dedicated much of its efforts to better understanding the relationship between environment and development, and to finding points of intervention to aid in effective policy making on the international, national, regional and local levels.

Despite the efforts of UNU and countless other international agencies and organisations, many of the problems identified by the UNCHE remain unsolved. While progress has been made, particularly since the United Nations Conference on Environment and Development in Rio in 1992, there are daunting challenges ahead. UN Secretary-General Kofi Annan has highlighted five specific areas—water and sanitation, energy, health, agriculture and biodiversity—that merit special attention. These are areas, says the Secretary-General, “in which progress is possible with the resources and technologies at our disposal today”. It is the task of the World Summit on Sustainable Development (WSSD) to design the strategy for future efforts in these areas and in others to promote sustainable development.

United Nations University offers this report as a first step toward achieving these goals. In this final report in the WSSD process, UNU offers a comprehensive overview of its work on sustainable development and the thematic and systemic issues that surround it. UNU’s research efforts reveal that integrated approaches to sustainable development are urgently needed. By identifying the economic, social and institutional elements of sustainable development as well as the way that these elements are

interrelated, UNU can inform the efforts to achieve the twin goals of environmental integrity and economic growth. The structure of this document follows the WSSD Draft Plan of Implementation to enhance the usefulness of this report during the negotiations and to better guide the reader through it.

To be achieved and maintained, sustainable development must be approached from several directions, through many different critical interventions and on a number of levels. Cross-sectoral approaches, interlinkages among multilateral environmental agreements at the regional and national levels, and national frameworks for sustainable development are just a few of the many strategies needed to improve the effectiveness of interventions for sustainable development. The following examples illustrate the complexity of the problems as well as the holistic and multi-faceted strategies needed to promote and achieve sustainable development.

Globalisation has intensified both the speed and volume of the flow of goods around the world. As trade increases, a debate about the ‘winners’ and ‘losers’ of economic globalisation has ensued. One of the ‘losers’, some assert, is sustainability. The complexities of the relationship between trade and sustainability have attracted much attention and debate in the international community. UNU’s research has acknowledged the intricacies of the rules and institutions within the context of the WTO, and offers possible ways to lessen potential incompatibilities between international trade and sustainable development. Consistent interpretation and application of recognised principles of international environmental legal instruments, removal of perverse sectoral sub-sidies, internationally agreed-upon guidelines for interpreting legal inconsistencies between agreements can all help contribute to harmonising the goals of trade and sustainability. Policies to increase compatibility between the rules governing trade and the environment must address these issues.

Since the Rio Summit in 1992, there have been great gains in the understanding of the relationship between poverty and environmental degradation. Yet 1.2 billion people live in abject poverty today, and the effects of this poverty on the environment are devastating. In rapidly urbanising areas, for example, poverty has myriad impacts on the natural environment. As migrants flock to cities, these areas are unable to absorb the huge influx of residents. Many who come seeking employment do not find it. Satellite cities and slums sprout quickly. Consequently, water, sanitation and sewer infrastructures struggle—and often fail—to meet ever-growing demands for services. This close relationship between poverty and environmental degradation signals that a focus on poverty eradication is paramount to the success of the WSSD.

Currently, land degradation threatens the food security of some 250 million people. As the fertility of arable lands declines due to desertification, those who rely on its productivity are increasingly vulnerable to poverty, and a host of other impacts. Land degradation also has serious effects on peoples' livelihoods, social stability and biodiversity. To adequately address the many facets of desertification, UNU has identified four dimensions of the problem that must be taken into account in policy frameworks for sustainable development. The technical dimensions of land degradation encompass renewable resources, their trans-ecozone characteristics, and the ways potential conflicts might be resolved by plans for integrated management. The human dimension of the problem includes land tenure rights, the role of and impact on local peoples, and the social conflicts and/or benefits that arise from various management approaches. Economic dimensions of desertification focus on the proper valuation of social, environmental and economic costs and benefits. Finally, the conservation and rehabilitation of ecosystems—the natural resource dimension—is also an essential element of policy responses to desertification.

Promoting sustainable development in mountainous areas is another complex and multi-faceted challenge. Mountains are critical to the survival and well being of many people across the globe. Home to more than 600 million people, mountains provide water to half the world's population. They are vulnerable to a number of threats: climate change, pollution, armed conflict, deforestation, population growth and harmful agricultural, mining and tourism practices. These threats are further exacerbated by regional differences in geography, ecology and culture that make a 'one-size-fits-all' solution difficult. To be effective, policies promoting sustainable development should address all of these considerations. Moreover, they should acknowledge and incorporate the cultural diversity of its inhabitants, and promote the use of local knowledge as a means to preserve biodiversity.

Unsustainable patterns of production and consumption have become a large problem, in terms of both seriousness and the volume of waste that results. The developed world in particular, with its voracious appetite for manufactured goods, is accustomed to high levels of production and consumption with low levels of eco-efficiency. United Nations University's initiative, the Zero Emissions Forum (ZEF), has investigated ways to reduce waste in industrial production by developing integrated systems in which waste products of one industry become the inputs of another. ZEF has demonstrated that there can be 'win-win' situations for both the economy and the environment in industrial production. Through inter-sectoral collaboration, information exchange and outreach, ZEF provides an opportunity for industries to discover potential areas of integration, and to exchange information and experiences about implementation. The symbiotic relationships between industries that result are envisioned to mirror sustainable processes found in nature.

Sustainable development will not be achieved without progress in science and technology to help repair environmental degradation. Under-



standing its role is therefore critical. Because technological developments tend to build on existing practices, there is often an inability to move away from those technologies with negative external effects. This is particularly true of environmental technologies, where certain practices often dominate the market. Global cooperation can surmount this barrier and the market dominance of certain technologies. Transnational research and innovative collaboration are needed to transition to more sustainable technologies.

The myriad challenges of sustainable development are insoluble without adequate human resources devoted to them. For this reason, UNU supports the Lüneburg Declaration on Higher Education for Sustainable Development of 10 October 2001. The declaration recognises the indispensable role of higher education in addressing challenges critical to sustainable development. UNU further recommends that the principles and priorities outlined in the declaration be adopted and pursued by governments, universities, non-governmental organisations, other stakeholders, and the various UN agencies involved in training and capacity development activities.

Perhaps one of the most complex issues surrounding sustainable development is the institutional framework that exists to create and implement policies. To effectively promote sustainable development, the entire international institutional framework should be closely examined and reformulated. The architecture of sustainable development should result in coherency in the international governance system, and in its policies and practices. The three pillars of sustainable development—economic, social and environmental—necessarily involve a diverse set of institutions. Strengthening governance between these pillars is possible.

One way to achieve stronger governance is through better coordination within the environmental sector. UNU's research on inter-linkages—the potential synergies between multilateral environmental agreements (MEAs) and the dyna-

mics of the global, regional and national scales—provides innovative solutions to the complex institutional framework of sustainable development. While efforts to enhance synergies across conventions at the global level should continue, enhanced coordination at the regional and national levels is also needed. Implementing global MEAs often requires regional frameworks to address the geographic, ecological, political and administrative particularities of that area. Recognition of these regional or sub-regional variances is the first step toward creating effective institutional frameworks. Clustering of MEAs according to their scientific and natural relationships may be another way to ensure greater effectiveness and cost efficiency. Work programmes could be developed for conventions related to biodiversity, oceans and seas, or chemicals and hazardous wastes based on common activities such as capacity development, technology transfer or education and awareness.

As each of these examples demonstrates, the WSSD faces an array of complex challenges. Each topic represents a constellation of inter-related issues that require a systemic, multi-faceted analysis and response. Thus, policy frameworks to promote sustainable development must recognise the complex nature of each issue, and develop integrative approaches to successfully achieve the goals of environmental integrity and economic development. In this report, UNU offers its insights into both parts of the process to facilitate the identification of appropriate policy frameworks for sustainable development.



## UNU Results on Issues Concerning the WSSD Draft Plan of Implementation

### *Poverty Eradication*

A focus on the eradication of poverty is paramount to the success of the Summit. In order to move forward on the issue, we need to concentrate on the lessons learned since the Rio Summit in 1992. Key lessons include the need to focus on both sides of the reciprocal relationship between environment degradation and poverty. It is also important to give priority to improving the ecosystems and resources upon which the poor depend (eg. water) and to endorse the ownership of essential support systems by the poor themselves. Other lessons include the importance of giving priority to the pre-growth stages of economic development rather than relying on 'trickle down' economic approaches. Empowerment of the poor is, for example, a core precondition for sustainable development and equitable environmental problem solving.<sup>1</sup> In addition, there is a need to upgrade the fiscal system in many countries to ensure that any savings from debt relief are effectively and speedily translated into pro-poor spending (particularly

primary education and basic health services).

Given the scale and depth of poverty in the developing world, fast poverty reduction is imperative. It is not only the case that people's incomes must be increased through better livelihoods in smallholder agriculture and micro-enterprises, but it is also crucial that human development be raised directly, through better basic health care, higher quality primary education, and investment in safe water and sanitation. Given the large demands that these pro-poor investments will place on the scarce financial and managerial resources of countries, close attention must be paid to the setting of priorities. At present, national priorities are often ill-defined as a result of underfunded and underdeveloped budgetary and planning mechanisms that are a reflection of fiscal problems and, in many countries, social conflict. This has meant that opportunities for accelerating poverty reduction are often missed.

<sup>1</sup> A useful resource for policymakers is the UNU/WIDER's income inequality database (the World Income Inequality Database found online at <http://www.wider.unu.edu/wiid/wiid.htm>) which tracks inequality over time and across countries, enabling national policymakers and their donor partners to give more attention to inequality-poverty linkages.

### *Conflict and Poverty*

Conflict, both civil war and war between states, is highly destructive of human capital and, more generally, of development. UNU research has demonstrated the importance of reducing the gap between rich and poor in an effort to ensure that grievances are not available to be exploited by unscrupulous leaders. In particular, this research has highlighted the importance of ensuring a fair and equitable allocation of public spending on basic services (across ethnic groups and regions), as well as a fair allocation of the burden of

taxation. If peace can be secured, then it is vital to engage in early economic and social reform to shift resources to pro-poor spending so that the most vulnerable can speedily rebuild their human capital and livelihoods. Unfortunately, the reconstruction process often leaves the poor behind, resulting in the creation of further grievance and an unsustainable peace.

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### *Water Management*

In the Millennium Declaration, the UN called on the nations of the world to "halve by 2015 the proportion of people who are unable to reach, or to afford, safe drinking water" and to "stop the unmanageable exploitation

of water resources by developing water management strategies at the regional, national and local levels, which promote both equitable access and adequate supplies". Currently over 1.2 billion people have no

access to safe drinking water and more than 2.4 billion have no adequate sanitation. 80 percent of all illnesses in the developing world are water-related, with 3 billion cases of illness and 2 million deaths occurring annually. At the same time, water pollution and aquatic ecosystem destruction are increasing. This global water crisis has hindered poverty alleviation and progress towards sustainable development.

In an effort to address this need in an integrated fashion, UNU has created, with the support of Canada, a global network on Water, Environment and Health (UNU/INWEH). The strategic focus of UNU/INWEH's programme is integrated capacity development and water stewardship. This is a matter of critical urgency, as one of the key contributing factors to the water crisis in many developing countries is the lack of indigenous capacity—scientific, educational, institutional, managerial and political—for effective water management.

In its first few years, UNU/INWEH has undertaken over two dozen training and capacity development

projects involving twenty-two countries. Three principal capacity development themes have been emphasised: urban water management; lake, river and groundwater management; and marine coastal ecosystem management. Activities have been undertaken primarily in East Africa, the Middle East and Latin America.

INWEH operates with minimal overhead and with the flexibility to assemble teams from different disciplines and countries with the precise skills and expertise to meet priority needs. To do so, it seeks funding for project implementation from third party resources, while encouraging project recipients and partners to contribute with counter-part and in-kind contributions. As a result, UNU/INWEH has attracted and leveraged millions of dollars in project resources, with over 3 dollars expended on projects per dollar invested.

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### *Gender Inequality and Poverty in Africa*

African women, particularly those in rural areas, are the main custodians of indigenous knowledge in natural resource conservation, management and food preparation. Studies in traditional food and agricultural systems have shown that women have developed effective methods of sustaining such practices as inter-cropping, which enhance the productivity of soils and crops. Through experimentation with wild species, these African women have discovered a diversity of wild resources for food. Subsequently, they have domesticated some of these plants and have accumulated and packaged information on their uses and preservation. Over the years, such information has not only been passed from one generation to the other but also has been shared and exchanged with other groups.

Since the 1985 Nairobi Conference marking the UN Decade for Women, African women have been linked to

activities that promote sustainable development. However, they still form the bulk of the poor in Africa and continue to face problems in almost all sectoral development activities dealing with natural resources management (production, processing, manufacturing industries, marketing or sales and utilisation, etc). These problems arise because of inequalities that put women at a disadvantage in education and training, employment, access to financial and other resources, access to innovative or appropriate technologies, access to loans, collateral and other measures to reduce poverty, adherence to unfavourable cultural and traditional practices, customs, and adherence to male-generated policies that do not create a 'level playing field' nor an enabling environment for women entrepreneurs.

UNU believes that changes in these conditions will lay the foundation for

sustainable development. To foster these changes, studies must highlight policies and interventions that minimise gender inequalities and

emphasise the critical role played by African women in the conservation and management of natural resources.

### *Urbanisation Poverty and Human Settlements*

Of the two billion people that will be added to the world's population over the next thirty years, approximately 99.5 percent will be located in urban centres. This translates into the addition of approximately 190,000 people daily to cities around the world. Yet the urbanisation of the world will not take place evenly as most of this population growth will take place in cities of the developing world. That is, for every five to six people added to cities in the developed world, one hundred will be added to cities in the developing world. Within the developing world there will also be extreme variation. Of total urban growth, approximately 61 percent, or almost 1.3 billion people, will be added to Asian cities. If new cities were built to accommodate all these people, this would mean that 130 new megacities would need to be created within the Asian region.

A comparison between cities in Asia and Africa highlights the need for diverse responses to urban growth that are based on local, national, and international conditions. It is becoming increasingly clear, for example, that in the twenty-first century, urbanisation is a driving force in terms of environmental change and that cities are the new engines of global economic growth. This is nowhere more so the case than in the Asian context and in parts of South America where cities are increasingly being considered as lynchpins in the search for regional environmental if not 'earth security'. Yet, in other regions of the world such as sub-Saharan Africa, massive urbanisation is taking place but without the high economic growth that is associated with Asian urbanisation. Furthermore, many of the cities in other parts of the African sub-continent have remained largely marginalised.

Recent UNU studies have indicated that rapid development processes

that have occurred under the influence of globalisation flows have followed a dramatically different path to those development processes that have been overlooked by globalisation. In Asia, transnational economic flows have been encouraged by national and local decision making that privileges growth over environmental concerns. This has left many cities within the Asian region in a condition of environmental stress. While many nations and cities have, since the 1997–1998 financial crisis, demonstrated an increasing interest in sustainable urban development, most public decision makers remain uncertain as to the type and nature of policies to implement in order to improve their environments. This is partly because environmental conditions vary tremendously among cities and across the region due to a variety of factors including differences in income, health, basic infrastructure, housing stock, and culture. At the same time, variations between environmental conditions within cities also seem to be on the increase. This said, the positive impact of recent efforts to reduce environmental degradation within these cities is becoming increasingly evident in some areas.

In many African cities that have remained largely isolated from the impacts of economic globalisation, the situation is very different. Rapid urbanisation has left many cities in a state of crisis because they lack sufficient economic vitality to employ vast numbers of migrants. As a consequence, entirely new cities have sprung up almost overnight with no water supply or sanitation and sewerage systems. What is more, many of the cities in Africa risk becoming even more disconnected from the global economic system because of the increasing digital divide.

There is still a crucial need for more in-depth research concerning the

relationships between increasing wealth because of globalisation-driven growth and demographic shifts, and environmental conditions in cities and the well-being of urban populations. As most data is collected at the national level, there is only a limited body of regional knowledge relating to the environmental conditions of most cities. This remains the case despite the recognition that cities play such a crucial environmental and economic role. It is vital, therefore, that more information be collected and assessed in order to further our understanding of the relationships between the driving forces of change, their impacts, the state of the urban environment, and current policy responses. The first step in understanding these complex inter-relationships is an urban assessment.

Urban ecosystem assessments, or the urban ecosystem approach, must become part of urban action plans to promote the understanding of these linkages. The key to urban ecosystem

approach is the connection between driving forces (ie. demographic shifts), pressures (ie. wealth and poverty), states of the environment (including the health of populations), and responses (or policies) related to urban activities that focus on the ability of cities to provide the environmental/ecological services needed for human well-being. As many cities throughout the developing world have not performed environmental assessments, notwithstanding integrated efforts, urban managers are at a loss for responding to pressing environmental conditions. Urban ecosystem assessments have the promise of facilitating integrated and multi-scaled policy analyses and therefore would be vital to decision-makers at all levels.<sup>2</sup>

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<sup>2</sup> In collaboration with a number of scholars and UN agencies (WHO and UNESCO/MAB) and other international organisations (International Institute for Environment and Development), UNU/IAS is leading an effort to conceptualise and promote urban ecosystem assessments as part of the Millennium Ecosystem Assessment. The assessments are envisioned to operate in ways commensurate with Local Agenda 21, since multi-stakeholder dialogues and public participation will be important components.

### **Protecting and Managing the Natural Resource Base of Economic and Social Development**

At the core of UNU's activities on sustainable development is the use, and operationalisation of integrated approaches. At the very essence of such approaches is the understanding of the link between natural ecosystems and the goods and services that they provide for human development and well-being. This is an imperative that is behind much of the work that UNU has been doing on fragile ecosystems such as arid and semi arid ecosystems, mangroves, tropical lakes, mountains, and also in the area of agrobiodiversity.

UNU has also recognized that the present state of knowledge is weak, from an integrated perspective of the Earth's ecosystem and its potential to provide continued service to humankind. Therefore, it is lending support to the Millennium Ecosystem Assessment (MA), which is a major global scientific assessment that will contribute significantly to the

development of a more complete understanding of the link between biodiversity and other environmental issues such as wetlands, desertification, and climate change. This assessment will also provide a more comprehensive account of the capacity of various regional, sub-regional, and sub-national ecosystems to provide the goods and services that are essential to the well-being and development of the peoples of the world.

Similarly, at a sectoral level, UNU is supporting the UN World Water Development Report (WWDR), a major, multipartner, UNESCO-based initiative to assess and report biennially on the state of the world's freshwater resources and to put in place supporting programmes to reduce major global information deficiencies.<sup>3</sup>

<sup>3</sup> See <http://www.unesco.org/water/wwap/wwdr/index.shtml>

### *Integrated Land Management*

The UN estimates that some 70 percent of the 5.2 billion hectares of drylands used for agriculture around the world have already degraded. This impacts on approximately 250 million people across the world, although some estimates suggest a figure that is four times higher than this. As an example, the worldwide area of arable land per person has been reduced by as much as 25 percent during the last quarter of the twentieth century. This has serious implications for food security and the

livelihoods of people who are dependent on the degraded lands. The impact of land degradation on ecosystems is also readily apparent in the destruction of biodiversity resources. According to UNEP estimates, about 65 million hectares of forest were lost across the globe during just the five-year period between 1990 and 1995. The resultant loss in biodiversity at genetic, species and community levels is also severe.

### Innovative Approaches for Integrated Land and Water Management

Development of integrated approaches for water and land management in drylands is critical to minimising adverse societal and economic impacts. This calls for actions to build and strengthen existing institutional capacities for regional, national and basin-level agencies to effectively address and integrate cross-sectoral aspects. These integrated approaches should be adopted to local and regional requirements, rather than using them as readymade solutions. A general framework for such integrated approaches must address the following closely interlinked dimensions:

#### a) Scientific Dimension

Innovative solutions have to be identified for managing land degradation, mainly through water use efficiency and productivity, and soil conservation. Re-use and recycling of water for agricultural and other uses is becoming increasingly attractive.

#### b) Human Dimension

Impacts of integrated water management on livelihood of local people need to be accounted for when designing and discussing resource management approaches. This, in turn, requires active involvement of local communities in the development and implementation of

such strategies. It is also important to account for the effects of indigenous practices on water resources, both positive and negative.

#### c) Economic Dimension

There is a need for evaluation of social, environmental and economic costs and benefits to ensure long-term viability of integrated approaches. At the same time, capital investment into developing new infrastructure as well as maintaining existing and traditional practices is essential.

#### d) Natural Resource Dimension

Rehabilitation of ecosystems in marginal lands should have the highest priority in integrated programmes, primarily through in situ conservation approaches. Due consideration must be given to trans-ecozone characteristics of resources, especially water. Planning and conflict resolution on a trans-ecozone level become crucial in approaches to improve the water resources distribution in drylands.

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## Mountains

Mountains are home to 600 million people and the source of water for more than half of the world's population. Degradation of these fragile ecosystems threatens to seriously worsen national and transnational environmental problems including floods, landslides and famine. Climate change, pollution, armed conflict, population growth, deforestation and exploitative agricultural, mining and tourism practices are among a growing list of problems confronting these "water towers of the world".

Mountain issues remain relatively isolated from the greater national and international political agenda. However, the designation of 2002, coinciding with the year of the WSSD, as the International Year of the Mountains (IYM 2002) will work toward ensuring the well-being of mountain and lowland communities by promoting the conservation and sustainable development of mountain regions. The UN Food and Agriculture Organization, the lead agency for IYM, is working closely with United Nations University and other organisations to ensure that the broadest possible range of expertise is focused on reaching the goals of sustainable mountain development. Much of UNU's work on mountain issues has been in the form of awareness raising through conferences, reports and a yearly calendar distributed globally depicting mountain ecosystems. UNU has also been conducting research on mountain issues and many of the findings have been instrumental in challenging conventional thought on mountain issues such as the cause of environmental degradation, flooding and the role of mountain people in conserving their own environment.

Regional dissimilarities make it impossible to propose generalised approaches to mountain-related issues, however, there are several issues that require urgent attention. The widespread conflict in mountain regions, including conventional warfare, terrorism, guerrilla insurgency and repression of minority peoples, must be tackled far more vigorously. The management and utilisation of the natural resources of mountains, especially water, must be undertaken

in such way that mountain people share in the benefits.

Information and data collection are needed before effective policy formulation can occur. While several of the world's mountain areas are in relatively good ecological shape, many face accelerating environmental and cultural decline brought on in part by government and multilateral agency policies too often founded on inadequate research. One of the problems here is that the opinions and experiences of mountain people need to be combined with scientific knowledge before a better understanding of mountain processes can be obtained. Cultural diversity, which is a prevailing feature of mountain life, must be considered as complementary to biodiversity if sustainable mountain development is to be achieved. What data policy makers generally rely on often relates to mountain ranges in the developed world, but is inappropriately applied to developing countries. Notions based on scant scientific data are often accepted as truths. For example, while there are serious problems in the Himalayas, massive deforestation has not occurred across the entire mountain system. Such misinformed assumptions have led to simplistic, and often counter-productive, remedies.

In addition to gathering and sharing more and better data and information worldwide, there is an urgent need to strengthen capacity in developing country mountain regions, in fields such as in meteorology, hydrology, ecology and soil sciences. These must also be firmly linked to the human sciences: anthropology, social science and human geography. The management of mountain regions and watersheds in a way that embraces and integrates many sciences will be a key to success. Also important is the promotion of alternative livelihood opportunities for mountain people in developing countries. This should help to alleviate poverty at the root of so many of their health and environmental problems.

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## Natural Resources (African)

Africa is richly endowed with diverse natural resources and its forests host the largest proportion of the world's reservoir of genetic materials. For example, Africa's tropical forests harbour over 8,000 species of higher plants, a figure only rivalled by the Mediterranean vegetation zone of South Africa. Africa's mineral wealth is legendary as the continent is one of the world's major sources of gold, diamonds, copper, tin, bauxite, manganese, uranium and crude oil. This enormous wealth in natural resources should provide potential opportunities for addressing the multi-faceted challenges facing the continent. However, past modes of exploitation and management of the natural resources have engendered some problems. In many instances, the exploitation of Africa's mineral wealth has fostered and fueled war and deprivation; situations that compound the already dire situation of the poor rural population.

Another concern is that the natural resources (food crops, useful plants, animal and land) that form the

mainstay of the livelihoods of most Africans and are being rapidly degraded. This degradation manifests itself in many ways, most noticeably in deforestation, in the loss of productive capacity of soils used for agriculture and pasture, in serious distortions in the hydrological balance and the access to water resources, and in the continuing loss of plant genetic resources.

The challenge is to ensure that Africa's natural resources serve as the basis for economic growth that would result in more active and sustainable participation in the global economy. Also crucial is to reverse the degradation of natural resources. Consistent efforts must be made in the short to medium term to build up the resources to levels never before attained in order to meet the demands of a population growing at more than 3 percent a year.

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## Conservation and Sustainable Use of Biodiversity

Conservation and the sustainable use of biodiversity is a key goal that has been stressed on a number of occasions in the preparations for this year's world summit and in major environmental treaties such as the Convention on Biological Diversity. The UNU has been working on the issue of biodiversity from the point of view of the conservation of agricultural crops and integrated land management. Biodiversity exists largely in landscapes that are managed for agriculture and rural livelihoods. Through generations of innovation and experimentation, farmers have nurtured a diversity of plants and animals, either wild or domesticated, and accumulated a vast amount of knowledge concerning the management of biodiversity. New commercial and intensified farming methods are, however, beginning to contribute substantially to biodiversity loss. In the face of these increasing pressures, it is crucial that the indigenous knowledge that has been gained through the process of

learning, experimentation, and innovation in farming and land management throughout the developing world is not lost. Indigenous knowledge of the management of fragile environments, the local genotypes of food crops and traditional farming practices has the potential to teach us many lessons on how to preserve diversity and halt environmental degradation. At present, an insufficient amount of research has been aimed at capturing the potential embedded within these indigenous knowledge systems.

Generations of farmers have experimented and developed innovative ways to manage biodiversity. In the process they have devised management practices that combine superior production along with the enhancement of biodiversity. One useful approach to the preservation of biodiversity within Asia is to promote best practice farm management by identifying 'expert' farmers and facilitating their training of other farmers, technicians,

scientists, extension agents, and policymakers. This represents a bottom-up approach to technology and knowledge transfer that is dramatically different from the top-down approach that is often used in agricultural extension and re-forestation programmes.

The most promising method of improving livelihoods by encouraging the maintenance of agrobiodiversity, relies heavily on hybrid management

systems that take the insights offered by locally developed knowledge, expertise, and practice, and integrates them with the most modern techniques. This strategy creates entirely new management systems that are both distinct and well adapted to local resource use patterns.

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## Forests

Over the last decade of the twentieth century, rapid deforestation took its toll with some fifteen million hectares of forests lost annually, mostly from the tropics. It is also clear that the structural integrity of much of the forest cover that remains has deteriorated. The facts are startling. Forests have virtually disappeared in twenty-five countries; eighteen have lost more than 95 percent of their forests and another eleven have lost 90 percent. The highest current estimate of the world's remaining forested areas is about 3.6 billion hectares from an originally forested area of more than 6 billion hectares. Primary forests have undergone the greatest transition. About 14 million hectares of tropical forests have been lost each year since 1980 as a result of changes in land use from forest to agriculture. Forest decline threatens the genetic diversity of the world's plants and animals. The decline of forests is relentless and could change the very character of the planet, and of human enterprise, within only a few years.

intrinsic understanding of the true nature of the value of forests. As people seldom realise the multiple uses of forests, its proper utilisation is often overlooked. A greater level of coordinated and integrated scientific research on the multiple different values of forests is needed among the international academic community. There is also a need to strengthen capacity development in order to inform foresters, researchers, policymakers, local communities and other actors of the true value of forests and to stress the important role of forest-based communities in supporting sustainable forest management.

Worldwide awareness building and a concerted effort for improving forest policy management are needed to promote the adoption of an "International Year of Forests" by the United Nations in the near future.<sup>4</sup>

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An effective approach to the problem of deforestation is based on an

<sup>4</sup> UNU and its partners have published several books on forests, please see: Matti Palo and Jussi Uusivuori (ed) *World Forests, Society & Environment, Volume I*, Kluwer Academic Publishers, 1998, Helsinki; Matti Palo and Heidi Vanhanen (ed) *World Forests from Deforestation to Transition? Volume II*, Kluwer Academic Publisher, 2000, Netherlands; Matti Palo, Jussi Uusivuori, Gerardo Mery (eds) *World Forests, Markets and Policies, Volume III*, Kluwer Academic Publisher, 2001, Netherlands.

## Oceans

### East Asian Mangrove Ecosystems

The coastal areas of East Asia are a critical and high-priority ecosystem. Agriculture, manufacturing industries, and urban areas are all major contributors to the pollution observed in East Asian coastal waters. The level of pollution in these areas

can be approximately correlated to the level of industrialisation in the countries adjacent to the coastal areas. This means that the most highly industrialised countries tend to have the worst pollution in their coastal waters. In addition, the

concentration of certain toxic pollutants, such as DDT, appears to be on the rise in East Asian coastal waters despite a ban on their commercial use. The influx of fertilisers, pesticides and herbicides has also increased in the recent years. Various parts of the coastal ecosystems have been seriously impacted by toxic pollutants that have land-based sources. The negative impacts on shellfish (such as mussels), mammals (such as dolphins), and mangrove forests are pronounced and have been well documented.

Furthermore, the previously widespread mangrove ecosystems in the Asia-Pacific region have been decimated in recent years as a direct result of human pressures including, shrimp farming, urban development, and tourism, etc. The loss of biological diversity as a result of this damage to the mangrove systems is severe. It is crucial from an economic development perspective, however, that any attempts to remedy current environmental problems take full

account of the potential socio-economic impacts that these remedies may have on those groups whose livelihoods depend upon coastal natural resources.

It is essential that some quantifiable indicators for evaluating mangrove ecosystems be developed. These indicators must incorporate socio-economic factors and could, usefully, be based on an assessment of goods and services provided at an ecosystem level. An in-depth evaluation of the impacts of the introduction of foreign species of mangrove plants into coastal habitats is also urgently needed. This is closely linked to biotechnology issues pertaining to the exploitation and modification of the living resources in mangrove ecosystems. Emphasis should be given to the evaluation of various novel uses of mangroves plants, including for medicinal purposes and as a food source.

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Conservation, Protection and Rehabilitation of Coastal Ecosystems and Communities

Human society and coastal ecosystems are very closely interlinked and interdependent. Vast majorities of the population live in coastal areas, and depend on marine and coastal resources for food, employment and income. Focused assessments made by UNU indicate that this human dependence on the life-sustaining coastal resources is under threat from a range of destabilising effects associated with human activities, including different forms of pollution and over exploitation. Coastal communities need to respond to these issues with informed management of coastal areas, and to share the lessons that they have learned in rising to this challenge.

A number of key strategies must be following to ensure protection and conservation of coastal ecosystems; these include:

- The involvement of communities in the design and implementation of coastal management approaches; particular emphasis should be placed on introducing sup-

plementary, rather than alternative, livelihood options.

- Raising the awareness of various stakeholders is crucial, and popular media and NGOs can play an important role in this.
- There should be systematic and sustained effort to map threats to coastal ecosystems; this will greatly help in prioritising action and focusing limited financial and human resources.
- It is essential to develop regional and international policy frameworks that will help ameliorate some of the transboundary and regional impacts on coastal ecosystems. In order to undertake these approaches, human and institutional capacity development in poor coastal communities is critical.

Increased, long-term investment in integrated capacity development is a critical and urgent imperative for coastal management.

- Capacity development must be

focused primarily at the community level, with greater emphasis placed on awareness raising and on local-level participation in decision making

- Alternatives to conventional monitoring are needed, with stronger research support for new approaches and local applied studies
- Improvements in water supply and sanitation, which remain grossly inadequate, must come from inno-

vative partnerships at the community level and from the application of existing and promising new technologies.

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*Freshwater Resources*

As the Secretary-General's Report to WSSD observed, many watershed boundaries do not reflect socio-political boundaries while more than 300 rivers cross such borders. This has led to a number of conflicts among basin countries. Conflicts have been resolved in a number of ways, such as: by negotiation exclusively between two riparian states (eg. the Ganges River between Bangladesh and India), or by mediation of a third party (eg. the Indus River between India and Pakistan or the Mekong River between Thailand and Vietnam). River basin organisations, including intergovernmental bodies by riparian states, have also been instrumental in abating conflicts among basin countries. The Mekong River Committee, for example, has been instrumental in this regard. Inter-governmental river basin organisations do not exist in the Danube River basin to deal with this sort of conflict among riparian states. Environmental monitoring can be a useful tool for providing scientific data and information to support decision making and conflict resolution. However, establishing such monitoring systems is a demanding task.

UNU activities have focused on water management approaches from the

angle of governance, capacity development and management tools. One useful outcome from UNU's work is a "Water Resources Management and Policy Series". Contributions to this series focus on policy-relevant topics of wide interest to scholars, practitioners, and policy makers.

While there is much discussion about the ways and means of managing international river systems, there has been less awareness of the nature of lakes as international water systems. This remains the case despite the fact that two or more countries share many of the world's large lake systems. UNU has been working to improve awareness and education on lake issues as international water systems, particularly from the point of view of management and balancing conservation with socio-economic development. UNU will incorporate its results and experience in this area by taking responsibility for developing the section on international water systems in a new guiding document for the future management of lakes called the World Lake Vision.

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## The African Great Lakes

The Rift Valley Great Lakes of Africa are invaluable resources at local, regional and global levels. Their surface water and tributaries provide domestic and agricultural water to over 50 million people, while supporting the largest freshwater fisheries in the world, and upon which millions in Africa depend for cheap protein and critical foreign exchange. The lakes are also a global treasure of aquatic biodiversity, containing over 10 percent of all species of freshwater fish in the world. These unique ecosystems are extremely vulnerable, however, as witnessed by the fact that eutrophication and exotic species introductions in Lake Victoria has resulted in the highest rate of vertebrate species extinction anywhere on the globe. Continued degradation of these systems will lead to a human tragedy with global consequences.

The management challenge facing the Great Lakes riparian states, which already struggle with serious underlying economic, environmental and social problems, is enormous. In fact, the costs of failure in terms of human and ecosystem health, as well as social and economic development, are even beyond the international assistance capacity of the developed world. Hence, the African countries themselves must meet this challenge, but can only do so by developing their own capacities for water resource management at the individual, institutional, national and regional levels. No single 'project' can achieve this goal. A new approach is required, one based on local ownership and responsibility, supported by strong international partnerships for problem solving. Without it, the needed 'bridge' to the developed world, across which knowledge, technology, experts and management approaches can be transferred, will not be built.

To help meet this daunting challenge, UNU has engaged in a continuing programme of research, capacity development and institution building in the African Great Lakes Region, focused on Lakes Victoria and Malawi.

In Lake Victoria, a project partnership with the National Water Research

Institute of Canada has established a physical limnology and water quality monitoring programme in the Ugandan sector of the lake. The project provided Uganda with the capacity to sustain a basic limnological monitoring programme, its first in history. UNU is also assessing the impact of pesticides on water quality in the Lake Victoria Basin and has developed a 'legacy database' for Lake Victoria. In Lake Malawi, UNU developed and deployed a predictive model of physical, chemical and water quality processes in the lake. The model enables local scientists to predict pollutant dispersal, rates of eutrophication, land use effects and appropriate mitigation strategies.

Based on these successes, the Malawi Government and the World Bank have invited UNU to collaborate in the establishment of the African Center for Aquatic Research and Education (ACARE) on Lake Malawi. ACARE will be an innovative centre of excellence for aquatic ecosystem research and capacity development to serve the needs of Malawi and the riparian countries of Tanzania and Mozambique for improved management of the Lake Malawi basin. UNU has assisted with the planning of the Centre and will take responsibility for its establishment and operation.

The mission of ACARE will be to undertake basin-scale monitoring, freshwater ecosystem research, capacity development and dissemination of scientific information and knowledge, thereby contributing to the resolution of pressing trans-boundary environmental issues that threaten the Lake Malawi watershed. Malawi, Tanzania, and Mozambique all have serious water management challenges, exacerbated by severe underlying economic, environmental and social problems. ACARE will help to overcome historical impediments to progress, including: past reliance on intermittent, narrowly focused, externally-driven projects; the fragmentation and inaccessibility of available information; the limited capacity for sophisticated instrumental analysis; and the unmet demand for technical expertise in national institutions, due in part to

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### *Impact of Natural Disasters*

It is in cities, with their large collection of human habitation, where disasters can cause the greatest damage. Death tolls from recent urban earthquakes have been large. The 1996 Tangshan Earthquake in China reportedly killed 250,000 people; the 1990 earthquake in Tabas, Iran, killed 40,000; and the 1991 earthquake in Spitak, Armenia, killed 20,000. Earthquakes are not the only deadly natural phenomena. In 1992, Hurricane Andrew brushed Miami and caused US \$22 billion in damages in the area. While the problem of disasters is a concern for both developed and developing countries, the impacts of disasters are much greater in the developing world. In areas such as Mexico City, Manila, Lagos and Accra, development has caused cities to grow in ways which exacerbate disasters because it forces more and more people to live in hazardous or disaster prone areas.

Although there are also mitigating aspects of living in a city that increase the chance of surviving disasters, these positive aspects such as the existence of facilities and the abundance of supplies, are usually countered by other negative factors. These include overcrowding, poor infrastructure, and the existence of more human-made hazards, such as dangerous materials and chemicals.

While these types of shortcomings are offset in developed countries through intensive planning, recent earthquake disasters in California and Kobe have demonstrated that these extensive mitigation measures are not enough. In many of these cases, the mitigation measures that were put in place fell short on one critical characteristic: the treatment of the social aspects of a disaster. Research has shown that city vulnerability is equal to human vulnerability. Yet,

most disaster planning currently focuses on the physical aspects of disasters, the weakness of buildings and structures, while focusing very little attention on the people who actually use and occupy the structures, ie. the people.

The key role that disaster management plays in the effective implementation of *Agenda 21* has been stressed on numerous occasions in preparation for the Johannesburg Summit. Natural disasters divert much-needed resources from other purposes, thus hampering an already difficult development process, especially in the poorest countries. The recently concluded International Decade for Natural Disaster Reduction has shown that it will not be easy to deal with such phenomenon.

In order to more effectively prepare for disasters it is important to consider the social aspects of vulnerability, effectively dealing with the people that will be affected by disasters. Linked with the other aspects of sustainable development, this will include the upgrading of the well-being of people before disasters, social support systems, partnership and networking, awareness and education, eradication of social and cultural stigma and racism, as well as prodding of political will and corruption reduction. Although somewhat distant to the usual approach to disaster management, it is nevertheless obvious that these are the root causes of vulnerability, which not only affect resistance to disasters impact, but also influence the capability of communities to rebound and reconstruct themselves.

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## ***Unsustainable Consumption and Production Patterns***

As pointed out in the Secretary-General's Report *Implementing Agenda 21*, a key to achieving sustainability is a "fundamental change in what the industrial societies produce and consume." Most of us are familiar with statistics of over-consumption and over-production which state that 15 percent of the world's population, in high-income countries, accounts for 56 percent of the world's total

consumption, while the poorest 40 percent, in low-income countries, account for only 11 percent of consumption. The question is how to work in practical and effective ways to improve these unsustainable patterns? In this section of the report, UNU offers two practical ways that industry and the United Nations itself can work towards achieving greater eco-efficiency.

## ***Industrial Waste and Eco-efficiency***

At the industrial level, UNU has been tackling the question of eco-efficiency through a programme called Zero Emissions that seeks to reduce waste and improve the productivity of resources by enhancing symbiotic linkages between industries. The Zero Emissions strategy is achieved by identifying value-added uses for process emissions as raw material inputs for other processes. The Zero Emissions concept is a practical method to achieve greater environmental sustainability. This approach has proved to be especially effective in Japan, where many firms have used it successfully to reduce industrial waste while maintaining profitability. Zero Emissions has excellent potential for a broader application. Such strategies could be implemented by reorganising industries into clusters such that each industry's wastes or by-products are

fully matched with the input requirements of another industry, and the integrated whole produces no waste of any kind. National governments could, with the cooperation of industry, sponsor feasibility studies to determine what sectors could most benefit from the application of Zero Emissions. In some cases, national investment in research and development will be needed to get past the initial non-market barrier that exists for all new technologies. As Zero Emissions symbiosis requires new cooperation between companies, local governments can play an important brokering role between firms, as well as stimulate development of Zero Emissions industrial parks.

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## ***Greening of the UN System***

Under the Global Compact launched by the UN Secretary-General Kofi Annan in January 1999, a new relationship between the UN and the world's business leaders is emerging. This relationship could help build the social and environmental pillars that are required to sustain the new global economy and make globalisation work for all the world's people. Within this framework, the Global Reporting Initiative has been established as a multi-stakeholder effort to create a common framework for voluntary reporting on economic, social and environmental aspects of corporate activities.

Related to this, as of December 2001, around 36,000 businesses around the globe, including a large and growing number in developing countries, have obtained certification under ISO14001 and the European Eco-Management and Audit Scheme.

While ensuring the move towards the creation of sustainable business practices, it is also important that the UN system as a whole promotes green practices within its own operations. The UN spends US \$3 billion every year on the procurement of goods and services (about 30 percent of the UN's total budget)

and operates facilities across the globe. It is also a convener of major international conferences and activities in different countries that require considerable travel for UN personnel.

A number of UN agencies take their environmental responsibilities very seriously. UNHCR, for example, has developed and implemented a green procurement system<sup>5</sup>; UNDP has implemented the Green Office Initiative, and UNU obtained ISO14001 certification in January 2001.

In line with the requirements of the Global Compact, there may be considerable merit in making greater efforts to ensure that the UN system has its own 'house' in order by

promoting the greening of the UN through the establishment of an effective environmental management system. Related to this, the UN should take measures to ensure that the major conferences, including WSSD, are implemented in a manner that is friendly to the environment and involves minimum waste. The UN organisation could also increase its use of information and communication technologies, including video-conferencing, in an effort to reduce staff travel and its associated environmental impacts.

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<sup>5</sup> Note: UNCHR (1996), *Environmental Guidelines*, UNCHR, Geneva.

## ***Globalisation and Sustainable Development***

Globalisation has an impact on the environment and sustainable development in a wide variety of ways and through a multitude of channels. The core challenge of economic globalisation is to focus its benefits toward those who need it the most. There are several possible solutions to this question, all of which need more research and consideration. Most of these solutions relate to the structure and functioning of the current global governance system. Some have suggested that current difficulties stem from the fragmentation of environmental and economic international institutions. Others suggest that environmental institutions are weak, with few compliance mechanisms when

compared to global economic institutions. Still more have suggested that there are no institutions in place that can gain control of the rapid forces of globalisation or its tendency to move power, capital, and technology in ways that serve only to make the rich richer, while leaving the poorest out on the margins.

If we are to truly realise the concept of sustainable development then we should work towards making better use of the positive connections between globalisation and sustainable development. One very practical area where this positive connection could be demonstrated is the trade and environment debate.

### *Trade and Environment*

The trade and environment debate has continually raised speculation and created a climate of uncertainty in regard to the potential incompatibilities between international trade and the goal of sustainable development. The underlying cause of this debate is the concern of developing countries that linking environmental and trade issues within the context of the WTO would lead to an increase in the number of environment-related trade restrictions that would limit their

access to global markets. Any future environmental or trade negotiations must be aimed at ensuring that this concern is not realised.

The Doha WTO Ministerial Declaration reaffirms the need to place developing countries at the heart of the future round of trade talks and also stresses its commitment to the objective of sustainable development. These two guiding imperatives must form the basis to finally resolve the ensuing inter-



national debate on the multilateral trading system and legitimate environmental concerns.

In this context, the work programme on trade and environment of the WTO that, according to the Doha Ministerial Declaration, will be proposed for the Fifth Session of the WTO Ministerial Conference to be held in Mexico in 2003, and be considered for the "desirability of future action", should include the following key issues:

- Consistent interpretation and application of the precautionary principle, and other recognised principles under international environmental legal instruments in WTO dispute settlement proceedings.
- Perverse subsidies are both harmful to the economy and to the environment. In a number of sectors (such as fish and fish products, and agriculture) they restrict imports from developing countries. In such cases, removing perverse subsidies is considered to be a 'win-win' scenario where the environment could be improved and the exports of developing countries and least developing countries could be expanded.

- Multilateral environmental agreement rules that have trade implications and which enjoy 'universality' must be recognised as having supremacy and authority over conflicting trade rules. Such cases must be considered legitimate exceptions under the WTO and regional trading agreements. Member states of multilateral environmental agreements and the WTO and other economic legal instruments should conclude mutually recognised guidelines of how possible legal inconsistencies could be interpreted between their respective agreements.
- Other UN agencies and international organisations must join forces to provide greater capacity development and technical assistance to create awareness and expertise to ensure that trade and environment can be mutually supportive. UNU, as the premier research and training institution within the UN system, could play a strong role in this regard.

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## **Health**

In the last ten years since the Rio Earth Summit, there has been both good news and bad news to report about global health. The good news is that, with the exception of HIV/AIDS, significant progress has been made on health issues. Average life expectancy has risen at a much sharper rate than in previous periods. For example, during the 1990s, China, India, and Indonesia added between two and four years to their average life expectancy. Chinese life expectancy increased from 68.8 in 1990 to 70.1 in 1999, Indian and Indonesian life expectancy increased from 59.8 and 61.7 in 1990 to 63.2 and 65.7 in 1999 respectively.

The bad news is that there is still a tremendous amount of work that must be done on environment-related diseases. Dangerous environmental conditions such as contaminated water, sanitation, and severe indoor air pollution, are at the root of many health problems such as respiratory and cardiovascular problems, vector borne diseases such as malaria and infectious diseases such as HIV/AIDS. UNU has been working in several aspects of the environment/health relationship, including health in cities, water and health, and food and nutrition.

## Water and Health

### Arsenic Poisoning

The pollution of groundwater—the primary source of drinking water—by arsenic in West Bengal (India), Nepal and Bangladesh has led to a crisis of unprecedented proportions. Some recent estimates show that more than 35 million people are potentially at risk from drinking arsenic-contaminated water; this indeed brings the problem to a catastrophic scale. By comparison, the current estimate of people possibly infected with the HIV virus worldwide is around 34 million. The sheer magnitude of this disaster means that we face new and unique challenges and tasks.

Awareness about the pollution of drinking water with arsenic and the significance of the crisis has risen significantly during the 1990s. Naturally occurring and human-induced arsenic pollution in drinking water has since been discovered in many parts of the world such as Argentina, Bangladesh, Chile, Taiwan, Hungary, India (West Bengal), Mexico, and USA. It is now recognised that dealing with arsenic contamination in groundwater is a problem of global dimensions.

It is important to understand the suffering of the large population impacted by arsenic poisoning through drinking contaminated water. Long-term exposure to arsenic in drinking water causes increased risks of cancer in the skin, lungs, bladder and kidney. It also leads to other skin-related problems such as hyperkeratosis and changes in pigmentation. A large number of

patients with visible or measurable health impacts are anticipated, although precise estimates for South Asia have not even been developed as yet. It is important to note that it takes several years of drinking arsenic-contaminated water to develop visible symptoms, although they may appear earlier in some patients. This makes estimation of the future number of arsenicosis patients quite difficult. At the moment, no reliable cure for these arsenicosis patients is available. At a minimum, ceasing the consumption of arsenic-contaminated water and improving nutritional health are shown to assist in recovering from early stages of arsenicosis. Therefore, provision of clean, safe water to all becomes an essential requirement.

In order to fully understand the arsenic crisis and to adequately respond to it, a number of gaps in the scientific knowledge must be filled. Importantly, information from scientific research should be directly fed into the development of strategies to cope with the arsenic crisis. UNU has undertaken such research work focused on better understanding the scientific problems. UNU is also engaged in conducting policy-relevant research and facilitating the dialogue on the mitigation of the arsenic crisis.

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### Waste Biosolids Management

Hundreds of other cities in the developing world, even those with modern sewage treatment facilities, often lack safe, environmentally sustainable, cost-effective programmes for the management of residual biosolids. If these materials are returned to watercourses, serious human health impacts can result. In 1998, UNU/INWEH initiated a pilot capacity development project on municipal wastewater biosolids management in Ciudad Juarez, in

Northern Mexico. The goal of this three-year initiative was to put in place an integrated, self-sustaining, locally managed system to collect, store, monitor, transport and apply sewage biosolids as an agricultural fertilizer—the first sustainable biosolids management program in Latin America. This successful project provided training for stakeholder groups; capacity development for operators and farmers; laboratory upgrading, accreditation and staff

training; development of a regulatory and compliance framework; full-scale agricultural application of biosolids; and the design of biosolids storage facilities. The project team included experts from Mexican, USA and Canadian municipalities, universities, research institutes, non-govern-

mental organisations and private sector enterprises.

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Nitrate Pollution

Most small villages in the Middle East and elsewhere lack adequate wastewater disposal systems, relying on individual household cesspits. This contributes to contamination of groundwater, which is often used untreated for drinking. Extensive use of manure as fertilizer aggravates the problem as runoff seeps into aquifers. A major contaminant in such situations is nitrate, which poses health risks, particularly for infants three months old and younger, as it leads to a diminished capacity of the blood to transport and transfer oxygen. Infants consequently suffer an ailment commonly called 'Blue Baby Syndrome'.

Fund for UN Development (AGFUND), examined groundwater pollution from cesspits, the impact of fertilization techniques and the relationship between nitrate concentration and the proximity of drinking water wells to pollution sources. The study will establish guidelines for efficient and economical cesspit design, for fertilization practices, and for buffer zones around wells to minimise nitrate pollution. It will also promote the planting of special crops around cesspits capable of reducing nitrate from seeping wastewater, and will train local staff to implement the guidelines.

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To evaluate human health impacts from nitrate pollution in subsurface drinking water, UNU/INWEH undertook a pilot project in Syria. The study, supported by the Arab Gulf

Marine Pollution in Gaza Strip

Only one-third of the more than one million people living in the Gaza Strip are serviced by wastewater treatment facilities, an unsafe situation further complicated by the lack of appropriate industrial zoning, the proliferation of unregulated stone quarries, and urban planning that does not take into account environmental quality issues. To determine the extent and health implications of this pollution, UNU/INWEH, in cooperation with the Islamic University of Gaza and the Palestinian Ministry of Environment, undertook a baseline survey of near-shore and beach water quality in the Gaza Strip. The study found that contamination of seawater by sewage outflows causes

widespread illness among users of popular coastal recreation areas along the Gaza Strip, with faecal coliform and faecal streptococci levels well in excess of US EPA standards at some locations. The worst seawater pollution was found in the central part of the Gaza Strip, where effluent from Gaza City is discharged. People in their teens and early 20s were the largest users and almost all who swam reported problems ranging from skin irritation and headaches to respiratory and intestinal illness. The study recommends a permanent monitoring program, upgraded wastewater treatment plants, a public awareness program including development of guidelines for bathing water and beach quality,

strict controls on fishing, and further study of health impacts, especially among children, of contaminated beach sands.

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### *Food and Nutrition*

According to the World Health Organization (WHO) nearly 30 percent of the world's population suffer from one or more of the multiple forms of malnutrition. Moreover, almost 50 percent of the 10 million children who die before the age of five in developing countries are malnourished. Nowhere is this problem more urgent than in Africa. Most African governments have commitments to reach nutrition goals set at the 1990 World Summit for Children, the 1992 International Conference on Nutrition and the Organization of African Unity Africa Strategy for Nutrition, and 1996 World Food Summit. The goal, to reduce by half the 1990 levels of severe and moderate malnutrition among children under five years of age, remains a distant ideal in most countries in 2002. A general trend of steady deterioration or stagnation continues. Between 1980 and 1995, the number of stunted children in sub-Saharan Africa increased by 62 percent, from 26.3 million to 42.6 million. Sadly, malnutrition contributes more to acquired immune deficiency than does the AIDS virus in sub-Saharan Africa. Consequently, child mortality due to malnutrition is staggering.

Yet, intolerable death rates do not depict adequately the nature of the problems caused by malnutrition. Malnutrition saps people's energy, retards children's physical growth and mental development, diminishes the benefits of schooling, and keeps nations trapped in survival activities that focus only on today, thus paradoxically forgoing tomorrow. Sustainable improvement in nutrition was the key to development in the so-called first world. It is no less important in Africa. The eradication of malnutrition is central to any development strategy for the continent. Investment in nutrition is

an investment in human capital and, thus national development.

The deteriorating situation in Africa demands a redoubling of efforts. More of the same will not do and our leaders recognise the imperative to act. The Millennium African Renaissance Plan is an example of the required response. It is an integrated African led plan that depends on home grown ideas and local ownership for poverty reduction. It understands the critical roles played by education and health; that is, the plan recognises the importance of human capital formation as the engine that drives development.

The key to effective action is the capacity to solve problems. In partnership with other UN agencies, UNU has been working to develop a ten-year plan for building individual, institutional, and organisational capacity in Africa. Action plans for the realisation of this concept were outlined in a series of workshop that UNU has spearheaded over the last two years.

Some of the key elements include the need to secure inspired African leadership in nutrition that is sustainable and capable of meeting the continent's challenges, driving the nutrition agenda at national levels, and mobilising inter- and intra- regional cooperation to achieve the eradication of malnutrition as a public health problem. The plans also outline the need to address the development of learning cooperatives, mechanisms for effective intra- and inter- regional cooperation, and medium and advanced training need.

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## **Means of Implementation**

The implementation of *Agenda 21* is a multi-dimensional and complex task that requires tough commitments by national governments, more generosity by the industrialised international community, and efforts to implement scientific and technological knowledge. Since the UNCED there has been a greater recognition of the importance of mobilising adequate financial resources to achieve the ambitious poverty reduction goals of the UN Millennium Declaration and to invest in the sustainable development of the developing world. During the last decade, global concern over the increasing polarisation between the 'haves' and the 'have-nots' in the world has grown, there is now a greater effort to identify and develop resource mobilisation strategies for

the developing world; the Monterrey Financing for Development Conference is testimony to this renewed effort. Turning awareness and improved understanding into a deeper financial commitment will, however, remain as the greatest single challenge for achieving sustainable development.

Making science and technology work for sustainable development and creating a global learning space for sustainable development at all levels of education, from primary school to university, is also an extraordinary challenge. In this regard the call made for a new contract between the science and technology community and society is a timely and a significant one and must be transformed into action.

### *Finance*

In recent years, international discussions about financing for sustainable development have become mechanical and predictable. The issue of financing sustainable development has also become incorrectly framed as a case of charity to be disbursed from the wealthier industrialised world to the poorer developing world. What is required is a fundamental reassessment of the way the international community currently views the relationship between financing and sustainable development.

The key to a possible solution may lie in the development of a more integrated policy approach that builds on the inherent interlinkages that exist between different environmental concerns and takes advantage of the improved coordination among policy mechanisms.

There is evidence that the Global Environmental Facility's position at the centre of more than one Multilateral Environmental Agreement (MEA) has helped it to avoid funding projects in one focal area that could have undermined the objectives of another focal area. For example, its climate change portfolio

has not included sequestration projects, which have been criticised as carrying the risk of promoting forestation projects with an emphasis on monoculture, rather than species diversity. Projects that hold the potential to interact with more than one focal area are grouped in a multifocal programme area of its own, which promotes investments consciously designed to be complementary across MEA objectives.

If greater synergy and coordination of multilateral environmental policy concerns can be achieved, it may be possible to balance potentially competing international agendas for environmental protection law, policy, and institutions (e.g. trade/investment and environment).

Regardless of amount, increasing the level of financial resources, without linking it to other types of institutional reforms, is not going to 'solve' the global environmental dilemma. However, if properly enacted and nurtured with adequate institutional support, innovative financing schemes may help leverage funds toward addressing a wide range of sustainable development objectives.

Science and technology policies are crucial to the achievement of sustainable development. The distinctive feature of modern economic evolution has been persistent innovation. While this has had spectacular effects on the performance of technologies and on human welfare, the benefits have been unevenly distributed, and often have been at the cost of significant environmental impacts. While market economies provide considerable incentives for innovation, they are characterised both by indeterminate benefits from innovation, and by imperfectly assigned costs. So market systems encompass both positive and negative technological externalities, on a very large scale. Environmental problems, broadly speaking, result from these negative technological effects, and will require radical changes if they are to be controlled or removed.

Some of the damaging externalities of existing technologies are addressed over time by the economic process. Where resources become exhausted, rising input costs can generate substitution processes, and more general incentives to cost reduction can have powerful effects on types and levels of inputs, and on accompanying pollution problems. At the same time, there are many changes that can be made via regulatory instruments, to mitigate or remove environmental damage. However, we should recognise that there are many environmental problems that are unlikely to be significantly affected by economic factors or regulatory action. This is particularly the case where innovation has been characterised by long-run cumulative development; that is, by building on past developments, with development occurring along a trajectory that builds on existing techniques. It is this

cumulativeness that underlies 'lock-in', ie. the inability to move away from technologies that are in some sense less adequate than alternatives. This is a particular problem in environmental technologies, since many major environmental problems spring from long-standing patterns of energy use, or long-standing patterns of pollution effects, that are intrinsic to the technologies that are dominant in the market and in use. In such cases any change from the existing technology needs to be highly innovative and usually large-scale. Where such changes are needed public policies have a vital role to play in the following:

- Developing technological alternatives
- Nurturing new patterns of production and use of technologies
- Helping to diffuse environment-friendly technologies
- Devising appropriate systems of regulation and governance
- Creating technological collaboration between countries, in particular North-South cooperation on environmentally-friendly technologies

Because science and technology policies are so central to improving environmental degradation, and to the achievement of sustainability, the development of science and technology capabilities with respect to the environment should be a central objective of governments worldwide. But governments acting alone cannot achieve globally relevant outcomes. New patterns of transnational research, innovation and collaboration are needed if sustainable development is to be achieved.

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## Higher Education and Sustainable Development

<sup>6</sup> The Lüneburg Declaration on Higher Education for Sustainable Development was adopted on 10 October 2001 in Lüneburg, Germany, on the occasion of the International COPERNICUS Conference “Higher Education for Sustainability: Towards the World Summit on Sustainable Development (RIO+10)” held at the University of Lüneburg from 8–10 October 2001.

Advances in science and technology have great potential to improve the well-being of society at large, but neither have been fully harnessed or mainstreamed into sustainable development. In the approach to the WSSD, the global academic and scientific communities have been examining how a new social contract could be developed could work towards achieving this goal. The idea behind their initiative is to increase the percentage of research and development that is carried out in areas of sustainable development. This would eventually enable societies to devote the appropriate resources to ameliorate social, economic and environmental sectors.

The new social contract envisioned by the global scientific community, however, could only materialise with basic commitments from essential sectors such as business, industry and government. At the most fundamental level, it will require a strong push towards bringing sustainable development into education at all levels, from primary to higher education.

The Lüneburg Declaration on Higher Education for Sustainable Development<sup>6</sup> of 10 October 2001 recognised the indispensable role that higher education plays in addressing the critical challenges of sustainable development. The Declaration recommends that governments, higher education institutions, non-governmental organisations and other stakeholders, and the various UN agencies and bodies involved in training and capacity development activities become part of this type of new social contract on science and technology. In particular, it calls on the WSSD to include education—specifically higher education—in its future programme of action. The Declaration also calls on UNU and other agencies to support these efforts and for international university associations to create a global learning environment for sustainable development.

UNU is well-situated as both the think tank of the UN system and as an international academic organisation to work towards promoting and realising the challenges of the

Lüneburg Declaration. One area that UNU can have a strong impact on is within higher education. Through working with university professors, educators and advanced trainers, UNU can assist higher education institutions to develop sustainable development modules within their curricula.

For example, in Africa, UNU has established a college of research associates, a network open to African scientists academics and technologists committed to the goal of applying science and technology to solve the seemingly intractable problem of food security in Africa. Members of the college collaborate with staff from UNU’s research and training centre on natural resources, UNU/INRA based in Ghana, to target research, education and knowledge sharing on conservation, management and efficient use of Africa’s natural resources for sustainable development.

This example of harnessing science and technology for sustainable development through a ‘training the trainers’ approach is useful, and should be replicated. To further this model, the advanced studies division of the University, UNU/IAS, will launch a Type II partnership at WSSD on Education, Science and Sustainability. The partnership will be between UNU and educators and will take the form of a fellowship programme. The fellowships will be for educators to participate in workshops and on curriculum development for creating university courses in the area of sustainable development. It is thought that this ‘training the trainers’ method will spur more sustainable development courses and direct science more towards the application of sustainable development at a grass roots level.

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## *Information and Communication Technologies*

While *Agenda 21* acknowledges the importance of information and communication technologies (ICTs), delegates at the Rio conference could not possibly have anticipated the vast implications of the information revolution that so dramatically shaped the last decade. Indeed, it is now widely recognised that information and communication technologies are “changing the ground rules for information flow in society.” The Internet and computer-mediated information systems shift the balance of control from information suppliers to consumers. Moreover, the pool of electronic information worldwide is growing exponentially.

In recognising the role that information and communication technologies could play, and to some extent are already playing, within the sustainable development challenge, it is crucial that the benefits of these technologies are made available to all. In this context, and in response to the resolutions made at the Millennium Summit in September 2000, the UN Secretary-General formed an advisory group of twenty-one experts from the private and public sectors to help bridge the digital divide by harnessing the potential of these technologies for human development. While this represents a significant step, much research is still needed in order to identify how information and communication technologies can best be used to further the purposes of sustainable development and, particularly, how they can best be utilised to the advantage of the developing world.

The rapid diffusion of information and communication technologies has resulted in the opening up of new avenues for the preparation and presentation of environmental information in formats that can be more easily understood by decision makers and the general public. Multimedia technologies, software packages, and such tools as indicators and animated graphical

presentations, can assist decision makers in understanding environmental change. Utilisation of the World Wide Web and other computer networks can facilitate rapid information exchange and communication essential to the pursuit of sustainable development goals. Sophisticated global, national and local environmental monitoring systems can be linked and accessed real-time to ensure feedback on the implementation of environmental sustainability objectives.

The speed inherent in ICT use has brought additional benefits in terms of bridging the gap between scientific data, policy decisions, action and education. This has, in turn, improved environmental governance by increasing the transparency of decision making processes, enhancing public awareness of environmental concerns, and thus complying with the objectives set out in Chapters Thirty-Six and Forty of *Agenda 21*. Increased transparency is just one example of the potential of ICTs to revolutionise policy formulation and education; full exploitation of this potential will require additional research.

It has also been increasingly recognised that the application of information and communication technologies can bring about environmental benefits through schemes such as teleworking and the development of e-commerce solutions. Regional strategies (eg. European Commission’s e-Europe strategy) could also offer a way to maximise the potential economic and environmental opportunities associated with the shift to an information society in across the globe. This should not be a case of ‘grow now, clean later’ but ‘grow a clean industrial structure now’ and share knowledge in the process.<sup>7</sup>

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<sup>7</sup> UNU is implementing a number of projects under the theme of ICT and the Environment. These include projects on information harmonisation for national reporting on multilateral environmental agreements, exploratory research on the impact of ICTs in relation to environmental conservation, and an exciting initiative called the UNU Virtual University.



*Criticality of Innovativeness in Communities*

*Agenda 21* clearly recognised the criticality of local communities and civil society, in general, in managing the local environment; almost every chapter contains a reference to the need to involve communities at the local level in environmental management. The increasing attention that is being focused on the local level has raised concerns regarding the capacity of local institutions and groups, including communities and citizens groups, to address local concerns while keeping global issues and implications in mind. Developing innovative capacities at the local level is critical; such innovations would provide local resources and local solutions to solve local problems while providing beneficial global impacts. The urgency of translating global talk to local action, and building capacity to facilitate that action, has spurred much discussion on the criticality of innovative action by and for communities.

Many ingredients go into the development of successful community-centred local environmental management, but key is the facili-

tative, or fostering, environment that enables communities to be innovative. Innovative communities nurture new ideas and solutions, focusing on knowledge, education, information exchange, and networking. Absorption and diffusion of knowledge and information is a critical part of its innovativeness. These communities can better manage development from a long-term perspective, focusing on implementation, behavioural change, and lifestyle. Innovative communities also tend to be more sustainable because of their capacity to respond to changes in the larger environment. They are better able to utilise their resources in a way to ensure that community members can attain a high degree of health and well-being, economic security, and have a say in shaping their future while maintaining the integrity of the ecological systems on which all life and production depends.

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## ***Institutional Framework for Sustainable Development***

For the WSSD, one of the most crucial areas is strengthening the institutional framework for sustainable development. Why? Policy makers need to ask themselves a very simple question. If most indicators show continued environmental degradation despite a proliferation of organisations and institutions put in place to protect the environment and work towards sustainability, then logically this begs the question of whether institutions are not part of the problem. Have they been effective enough? How can we strengthen them to fully address the scope, magnitude and complexity of sustainable development?

To effectively protect and preserve the natural environment, environmental institutions, at all levels of governance, must better reflect the link between environmental problems and the underlying economic and social issues that most likely led to them. In this respect, all aspects of the debate over institutional reform is influenced by the recognition that, in an increasingly globalised economy, international environmental institutions must be able to address key social and economic issues that may not be included in their primary mandate.

Without an overarching structure or process to provide guidance, one of the keys to establishing and maintaining coherency within sustainable development governance lies in the relationships between the institutions of different regimes, including, environment, trade, health, and peace and stability. The development of strong and clear complementarities and compatibilities between different international regimes and bodies of international

law will both help to create, and reflect, a balance between the three pillars (economic, social, and environmental) of sustainable development.

An explicit recognition of the inherent links between the economic, social, and environmental aspects of sustainable human development was evident at the first UN Conference on Environment and Development ten years ago. Yet, this recognition is still not adequately reflected in the overall architecture of the international governance system.

The lack of coherency within the formal international institutional architecture reflects a persisting high level of disagreement regarding what constitutes an effective and appropriate approach to achieving sustainable development.

The inability of the international community to agree upon a common approach to sustainable development governance is rooted, to a large extent, in disparities between the perspectives and priorities of developed and developing countries. Reducing and overcoming these disparities remains, therefore, a critical prerequisite for the creation of an effective, efficient, and equitable system of sustainable development governance.

The following section offers some solutions for strengthening sustainable development governance from three levels, between the institutions of the three pillars of sustainable development, within the environmental governance sector itself and between the scales (local, national, regional and international).

### **Strengthening Governance between the Three Pillars of Sustainable Development**

**What is the Most Effective Governance Framework for Sustainable Development?**

In the past decade, the international community has expressed growing concern over the proliferation of international legal and institutional arrangements aimed at addressing specific environmental problems. This

concern centres not only on establishing a functional framework for coordinated international action but also on maximising the limited resources available for environment protection.

Recently, the UN Secretary-General established the Task Force on Environment and Human Settlements

as part of the overall reform of the United Nations, and noted the formidable challenge facing the international community in attaining “a sustainable equilibrium between economic growth, poverty reduction, social equity and the protection of the Earth’s resources, common and life support systems”. He also concluded that experience had demonstrated the need for a more systemic approach to policies and programmes through mainstreaming

the United Nations commitment to sustainable development.

Many of the specific proposals put forward with this goal in mind involve reforming existing UN bodies in an effort to provide them with a broader role. Some of these bodies include: UNEP’s Global Ministerial Environment Forum, the Commission on Sustainable Development, the Economic and Social Council, and the UN General Assembly.

a) Global Ministerial Environment Forum (GMEF)

In 1999, the UN General Assembly established the GMEF as an annual, Ministerial-level forum. In the years that it meets in regular session, the UNEP Governing Council serves as the forum, and in alternate years, GMEF takes on the form of a special session of the Governing Council. An effectively functioning GMEF could help strengthen the normative authority of UNEP. It could clarify the links between UNEP and existing

instruments, such as MEAs. It would also clarify the role of UNEP in contributing to the wider sustainable development agenda. Similarly, as the G-77 has recently proposed, the GMEF could be remodelled to transcend the mandate provided the UN General Assembly and “provide general policy guidance to, and promote coordination with, the other relevant organisations in the environmental field”.<sup>8</sup>

<sup>8</sup> G-77, *Non-Paper*, 5.10.2001, adopted provisionally by the G-77 Nairobi Chapter at its General Counsel Meeting on 5 October 2001.

b) Commission on Sustainable Development (CSD)

Rather than seek a more powerful mandate or higher intergovernmental status, a better approach may be to redirect the CSD toward collaborative work, when possible, with similar UN organisations that focus more closely on aspects of sustainable development. Rather than ‘bigger and broader’, the focus should be more narrowly focused on tasks that the CSD could actually accomplish and to areas where it could add value. A redefined mandate, therefore, could include the following:

decision on oceans, inter alia, recommended that the General Assembly establish an open-ended informal consultative process to facilitate the consideration of matters within the GA’s existing mandate. For tourism, the CSD was responsible for introducing the issue into the Rio process and then developing an international work programme on sustainable tourism. In both examples, the CSD focused on how it could contribute to integrated decision making by providing better consideration of the overall policy matrix.

A more narrow and realistic focus for the CSD could be to train its focus on the functioning of the UN itself, rather than the world as a whole. A systemic approach would focus, in simplest terms, on what the UN is or is not doing. If the UN is acting, is it adequately addressing the sustainable development aspects of a given issue area? Two of the CSD’s most notable areas of successes stem from the CSD-7’s decisions on oceans and tourism, both of which led to actual changes in the manner in which the UN considered these issues. Its

This approach for the CSD should be distinguished from the coordination role under consideration for the EMG.<sup>9</sup> Governments clearly attach importance to coordination efforts that go beyond issue management and proposed actions, which strive for enhancing policy coordination across the UN system, and include reporting annually to GMEF on specific issues arising from the work of the UN system in the environmental area. While a systemic

<sup>9</sup> EMG was established following the adoption of General Assembly resolution 53/242, and includes amongst its members the specialised agencies, funds and programmes of the United Nations system and the secretariats of multilateral environmental agreements. It follows an issue-management approach, whereby issue-management groups are established within the organisations concerned in order to address specific issues identified by EMG within an established time frame. Issues selected so far include the harmonisation of biodiversity-related reporting, the development of a system-wide approach to environmental education and training, waste management and chemicals.

approach for the CSD could overlap to some extent, its revised mandate should go beyond environmental

matters to address developmental aspects as well.

c) Economic and Social Council (ECOSOC)

ECOSOC could play a useful role in terms of providing for greater coherency and direction to all environmental-related UN activities. Its broad mandate, which encompasses economic, social, human rights and other issues, could provide a basis for integrated and comprehensive institutional development because it offers scope for some adaptability. ECOSOC could attempt to develop its coordination function, which encompasses a large part of the UN system. This could involve strengthening its relationships with UN specialised agencies and strengthening its current role in promoting integrated and coordinated followup to major UN conferences.

The political acceptance of new role for ECOSOC would be limited in light of its less than prominent role in

the past. ECOSOC is not generally regarded as an effective body. The Secretary-General's proposals for UN reform in 1997 noted that there may be a need for a long-term fundamental rethinking of the role of ECOSOC, in addition to the immediate priority of enhancing its policy management and coordinating roles. The issue of Charter revision could also arise if extensive adjustments were made to ECOSOC's area of activity. If attempted, such a revision would be difficult, since ECOSOC's mandate 'competes' with the Bretton Woods institutions (the IMF and World Bank) in its task of advancing UN purposes in the economic and social areas. Furthermore, ECOSOC's large subsidiary machinery makes it difficult for it to implement a strong coordination role.

d) A New General Assembly Committee on Sustainable Development

Another option for sustainable development governance is to increase the sustainable development focus of the General Assembly, possibly through a new committee. The General Assembly debates on environment and sustainable development could provide more direction to international action, as well as highlight broad priorities, address redundancies and unclear mandates. Recent developments on enhancing complementarities among international instruments related to environment and sustainable development could be expanded.

One limitation is that the General Assembly's large membership and extensive agenda may not provide an ideal basis for effective outcomes, as many of its resolutions tend to have little impact. The non-binding nature of the Assembly's resolutions has attracted attention, with detrimental comparisons being drawn with the decision making powers of the

Security Council. UN reform proposals have tried, but so far mostly failed, to focus the Assembly's agenda and revitalise its debates.

The most prominent obstacle is politics. Issues on the Assembly agenda usually become part of a complicated package of trade-offs, which means environment and sustainable development can 'lose out' in the process. The personalities and working methods of the Assembly (for example, the informal, unpredictably scheduled processes for agreeing on resolutions) can also be a problem.

Nonetheless, developing countries view the Assembly as a body in which their interests are fairly represented, which could help build acceptability of reinforcing the Assembly's role. It also has the power and legitimacy to coordinate economic and social institutions outside the environmental sector.

There is a strong need for coherency and complementarity between international environmental law, emerging sustainable development law, and the wider corpus of international law. Existing dispute settlement, enforcement, or judicial mechanisms or those that are emerging to support international sustainable development governance, must be able to work in close coordination with other international organisations, courts, tribunals, and the wider nongovernmental community. For example, when it was first established as the trade regime the GATT/WTO system was wrongly considered as a special regime delinked from other rules of international law, including international environmental law. It is in fact this delinking of the trade regime that represents a large part of the current challenge for the architects of international law.

Strong arguments can be made in support of the current system of institutional monitoring. It should be noted that this system has been relatively successful in terms of achieving compliance and avoiding disputes. At the same time, there is no technical or specific reason why a system of judicial enforcement could not complement, rather than replace, the current monitoring system. This could be done either by injecting a stage of third-party adjudication, based on the rule of law (not power-politics) into current compliance procedures, or by providing for a distinct process of judicial settlement when compliance procedure have failed to resolve a matter.

Without a judicial branch of international sustainable development law, there is a danger that a two class society of international norms will develop based on those that can be judicially enforced, such a WTO rules, and those that can not. Judicial enforcement of international sustainable development law would help ensure that sustainable development norms do not become second tier norms.

The lack of compulsory universal, or semi-universal, enforcement or dispute settlement mechanisms within international environmental law and sustainable development law is the result of a political decision on behalf of states that will not be resolved by institutional reform. Judicial settlements have not happened because states are reluctant to grant jurisdiction to courts and tribunals that would allow states and or non-state actors to challenge their environmental policies or conduct.

Until such point in time, if ever, that the political will exists to establish an international judicial organ, with both compulsory and universal jurisdiction, the purposes of international sustainable development governance may be well served by strengthening concern for the environment within other international regimes such as trade (WTO dispute settlement mechanisms) and peace and stability (UN Security Council) in the context of the environment.

### *Strengthening Coordination within the Environment Sector*

#### Interlinkages between Multilateral Environmental Agreements at the Regional and National Level<sup>10</sup>

In recent years, attention has focused on improving inter-agency coordination at the global institutional level, mainly as a result of the UN Secretary-General's proposals for better issue management and the 1998 Report of the UN Task Force on Environment and Human Settlements. Several of the Task Force's recommended actions pertain either directly or indirectly to the growing number of linkages among environmental conventions.<sup>11</sup>

While efforts to enhance synergies at the global level must continue, challenges and opportunities for enhanced coordination at the regional and national levels also need to be addressed.<sup>12</sup> Examining the dynamics of these two scales is important for a number of reasons. First and perhaps foremost, abundant natural linkages exist in ecosystems having boundaries within and across the sub-national, national and regional levels. This geographic grouping offers promising scales to

<sup>10</sup> *United Nations University Policy Report (Draft), Interlinkages: Synergies and Coordination among Multilateral Environmental Agreements: National & Regional Approaches in Asia and the Pacific, Tokyo: UNU, August 2001.*

<sup>11</sup> *See Report of the United Nations Task Force on Environment and Human Settlements. A/53/463, 6 October 1998.*

<sup>12</sup> *The regional and national levels are defined broadly. Regional may comprise any sub-regions; national may include sub-national and local levels.*

implement agreements using a synergy approach and can achieve visible as well as tangible results on the ground.

Second, implementing global multilateral environmental agreements often requires regional frameworks and cooperative action plans to specify how global agreements can be applied to the contextual particularities of a geographic or ecological region or sub-region. Such frameworks and action plans are elaborated regularly in the scope of regional or sub-regional intergovernmental meetings, such as the African Ministerial Conference on the Environment, the Asia-Pacific Ministerial Conference on Environment and Development, the ASEAN Senior Officials on the Environment or South Pacific Environmental Cooperative Programme. They may also result from the negotiation of specific arrangements designed to apply global multilateral environmental agreements to a given region, or to protect a threatened resource in a given area. The same applies to the national level in the sense that global and regional agreements require action plans (NAPs) and strategies that provide guidance on how environmental commitments will be implemented sub-nationally and locally.

Third, although there are worthy avenues to establish synergy and mutual support among global multilateral environmental agreements (eg. Rio Convention), most agreements are regional in scope, such as the various environmental conventions negotiated under the auspices of the UN regional economic commissions or sub-regional organisations and programmes (e.g. ASEAN, SPREP, SACEP). There are also interesting avenues and possible synergies to pursue across regional and sub-regional arrangements.

Fourth, many of the administrative problems experienced at the global level also surface at the regional and national levels in the form of coordination and conflicting institutional roles, communication failures, duplication, etc. For effective implementation to take place it is important to address any existing deficiencies that may impair proper and effective environmental management.

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Clustering of Multilateral Environmental Agreements<sup>13</sup>

A fundamental starting point for environmental law and policy is science. The bio/geophysical relationships between sectors, substances and the inter-relationship of ecosystems, and activities that multilateral environmental agreements seek to protect or regulate, provide an obvious organising principle for their coordination. From this starting point policymakers could ensure greater effectiveness and cost efficiency of multilateral environmental agreements by initiating a process to strategically group MEAs together according to their scientific and natural relationships. A suggested grouping could be the following:

- Conventions related to biodiversity (possible sub-clusters are regional, sea, etc)

- Conventions related to oceans and seas
- Conventions related to fresh water, forests and lands
- Conventions related to the atmosphere
- Conventions related to chemicals and hazardous wastes

Pragmatic work programmes could be devised within each grouping based on common functions such as capacity development, technology transfer, education and awareness raising, and information dissemination and reporting. Such clustering should consider more effective modalities for future international negotiation, scientific assessment, and international-regional-national implementation and coordination.

<sup>13</sup> *Ibid*

There is no one single approach to the strategic integration, or clustering, of MEAs that is likely to present the most beneficial or practical option because each clustering effort should be aimed at resolving a specific problem or weakness in the current system. The most promising way to approach the clustering of MEAs appears to be a pragmatic combination of approaches. In each case, it would need to be assessed which elements or functions of which MEAs can reasonably be integrated.

The clustering of MEAs is best understood as a step-by-step process rather than as an objective in itself.

As a first step, structures for coordination between MEAs can be established and/or elaborated and diversified, including joint meetings of convention bodies and secretariats, memoranda of understanding, joint implementation of common activities, communication networks, routines and structures etc., where appropriate and feasible. Such cooperative arrangements might then evolve over time leading to more formal structures of coordination.

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*Strengthening Governance  
Between Scales (Local, National,  
Regional, International)*

National Frameworks for  
Sustainable Development

Strategic planning frameworks for sustainable development are an effective method of identifying the priorities, compromises, and tradeoffs that countries must take account of in order to achieve sustainability. Such frameworks should measure progress and set priorities. They should also identify, analyse, and help show how best practices can be adapted in pursuit of the socio-economic and environmental goals outlined in *Agenda 21*. As an example of how such frameworks could be constructed, UNU has formulated three strategic frameworks that focus on China, India, and Indonesia. The frameworks were country driven and considered specific country factors that are inherent to large developing countries. These include the tremendous population pressures that can give rise to deforestation and soil erosion as well as the natural resource endowments of each country.

Many of the key recommendations put forward in the sustainable development frameworks formulated within UNU projects have centred on the need to create more effective, integrated, and transparent national institutions. Such institutions are required to develop the kind of broad packages of policy instruments,

including economic instruments, which are essential to sustainable development. These institutions are also crucial in terms of reconciling economic development and environmental priorities within large countries with diverse populations. This is even more so the case given the additional pressures that are caused by rapid globalisation.

The effectiveness of these integrated national institutions will depend, to a large extent, on their capacity to establish positive partnerships with national and international private sector interests and also upon their ability to engage civil society and community actors in a constructive manner. A diverse stakeholder base is necessary because of the controversial nature of policy reforms directed towards sustainable development such as raising prices, closing polluting factories, accepting international agreements and prohibiting farming or grazing in degraded ecosystems. Without popular support for these reforms, changes will be difficult. The effectiveness of these institutions will also depend on their success in terms of coordinating the work of various ministries and agencies in order to reduce the overlaps and contradictions that exist between them.

Their effectiveness would also be enhanced if they prove capable of taking advantage of any possible synergies that exist between various ministries and agencies.

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#### Subsidiarity and Environmental Decision Making<sup>14</sup>

The principle of subsidiarity, which calls for decisions to be made and implemented at a level appropriate to the problem they address, should be facilitated in environmental management and governance. Ecosystems are best defined, understood and protected at the regional or local level rather than the global level. The level and type of decisions taken have to match the scale of the challenge or issue. This has long-term implications for the empowerment of communities and their ability to decide for themselves

those aspects that affect their everyday lives. Creating an environment that facilitates such subsidiarity is a challenge for local governments, stakeholders, and for those responsible for global decision making as well as regional and national implementation.

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<sup>14</sup> *United Nations University Policy Report, Interlinkages: Synergies and Coordination between Multilateral Environmental Agreements, Tokyo: UNU, 1999; United Nations Meeting Report, World Summit for Sustainable Development International Eminent Persons Meeting on Interlinkages Strategies for Bridging Problems and Solutions to Work Towards Sustainable Development 3-4 September, Tokyo: UNU September 2001.*



## UNU Partnerships and Activities to Implement Agenda 21

The overarching goal of UNU is to advance knowledge for human security and development. To this end, the overwhelming majority of our research and capacity development efforts are focused on developing countries and the sustainable development issues that concern them the most. A large share of UNU's budget is specifically devoted to its post-secondary education and capacity development

programme. A recent survey among the various contributors to UNU's capacity development activities has shown that these are widely and highly appreciated and have in many cases been critical to the career development of the participants. Encouraged by this assessment, UNU is establishing a UNU Capacity Development Fund to help strengthen and further expand its capacity development programme.

### **WSSD Type II Partnerships**

At the WSSD itself, UNU will also be involved in or directly launching three new partnerships in the Type II

category highlighted as a beneficial outcomes by the WSSD Chairperson and member states.

#### *Type II Partnership on Mobilising the New Social Contract on Science and Technology for Sustainable Development: The UNU/IAS Higher Education Fellowship Initiative on Science for Sustainability*

The Lüneburg Declaration on Higher Education for Sustainable Development recognised the indispensable role that higher education plays in addressing the critical challenges of sustainable development. At the same time, the academic organisations of the world, including ICSU and the TWAS have called for a new social contract for mobilising science and technology for sustainable development. To achieve both goals will require the development of stronger curriculum for educational organisations to develop into their education programmes. UNU/IAS will offer fellowships to

'train the trainers' to meet this goal. The fellowships will target professors from developing countries to enhance the accessibility of science in the pursuit of sustainability.

Partners: UNU, International Council for Scientific Union (ICSU), Third World Academy of Science (TWAS), World Federation of Engineering Organisations (WFEO), and Science Council of Asia (SCA)

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#### *Type II Partnership on Inter-linkages between Multilateral Environmental Agreements (MEAs)*

This partnership will build upon the thirteen-country case study, which UNU and its partners have undertaken towards the determination and the transfer of lessons learned for the implementation of MEAs both at the national and regional levels. The framework being promoted by the initiative, which is based on studies on the inter-linkages among the issues that various MEAs deal with, promote ownership, partnership that lead to better effectiveness and efficiency in dealing with these MEAs.

Partners: UNU, Economic Commission for Africa (ECA), European Union (EU), United Nations Environment Programme (UNEP), South Pacific Regional Environmental Programme (SPREP), Association of Southeast Asian Nations (ASEAN), and the Japanese Ministry of Environment

#### *Further Information:*

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*Type II International Partnership for Sustainable Development in Mountain Regions*

The partnership addresses the priority of improving livelihoods, conservation and stewardship throughout the world's mountain landscapes. The strategy proposed to help achieve this objective is to improve, strengthen and promote greater cooperation and partnerships between major groups, all mountain stakeholders, such as donors, implementing agencies, NGOs, the private sector, mountain communities, academia, and other field practitioners. The partnership will be guided by clearly agreed goals, its operations will be based on

commitments made by partners and implementation will be supported through better linkages between institutions and improved monitoring systems.

Partners: UNU, Food and Agriculture Organization (FAO), United Nations Environment Programme (UNEP), and the Swiss Agency for Development and Cooperation

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**Existing UNU Partnerships and Capacity Development Programmes**

All parts of the UNU system engage in capacity development activities and there are a number of existing programmes and initiatives in the area of sustainable development. These are aimed at strengthening academic institutions in developing countries, increasing the capability of young scholars and professionals, and contributing to the extension, application and diffusion of knowledge. UNU places a strong emphasis on strengthening co-operation among institutions in developing countries and building 'South-South' cooperation to further enhance the teaching and research capacities of existing centres of excellence. The University also aims to alleviate the intellectual isolation of researchers and institutions from developing countries by supporting their integration into the wider international academic community.

Throughout the last ten years, UNU has undertaken a wide range of both long-term and short-term post-secondary education and capacity development activities that are aimed at enhancing the potential of developing countries to meet their environmental and development objectives. Many of these activities were explicitly endorsed within *Agenda 21* and also fall under the umbrella of action recommended within the Lüneburg Declaration on Higher Education for Sustainable Development. The following descriptions outline the types of activities UNU has engaged in over the last decade. A more detailed outline of UNU activities in this regard can be found in the University's annual reports and the reports of the various research and training centres and programmes.

*Fisheries*

Over-capitalisation of the world's fishing fleet has led to over-exploitation of fishery resources. World fisheries are now on the verge of becoming another natural resource disaster. This situation has created a new demand for high professional standards in relation to a large number of fisheries skills, particularly in the developing world. In order to meet the growing needs of developing countries, United Nations University, in cooperation with the Marine Research Institute of

Iceland and with the support of the Government of Iceland, holds an annual six-month fisheries training course. This course provides advanced training in various fisheries-related areas to specialists from the public, private and academic sectors in developing countries. Provincial fisheries administrators, fisheries scientists and operational managers, economists, planners and technicians receive in-depth, individualised training in fisheries policy and planning; marine

and inland waters resources assessment and monitoring; quality management of fish handling and processing; management of fisheries companies and marketing; fishing technology; fleet operations; aquaculture; or environmental pro-

tection assessment and monitoring.

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*Geothermal Energy*

The overall aim of the UNU Geothermal Training Programme in Iceland is to assist developing countries that have significant geothermal potential to build groups of specialists with a competence in most aspects of geothermal exploration and development. In each annual six-month course, specialised training is offered in geological exploration, borehole geology, geophysical exploration, borehole geophysics, reservoir engineering, chemistry of thermal fluids, environmental studies, geothermal utilisation, and drilling technology. The trademark of this training course is that it provides university grad-

uates that are engaged in geothermal work with very intensive on-the-job training in their chosen fields of specialisation. The trainees work side by side with professionals of Orkustofnun, an agency actively working on most aspects of geothermal research, exploration, and development. Within each course, the training is tailormade for each individual and the needs of his/her institution or country.

*Further information:*

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*Software Technology*

The UNU Institute for Software Technology in Macau, China, provides advanced training to young software engineers from developing countries. Training is offered in software research and development, curriculum development for post-graduate and postdoctoral courses in formal software development, and the development of curricula for computer science departments. Recently, the Institute extended the scope of its advanced courses and

training schools on the RAISE method and duration calculus, creating web sites and algorithmics to include new training courses on software project management and the co-design of hardware and software systems.

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*Food Technology*

With the aid of private funding, UNU organises an annual twelve-month training programme on food science and technology at the National Food Research Institute in Tsukuba, Japan. The programme targets scientist at universities or research institutes in developing countries, with a particular emphasis on the Asia-Pacific region. The programme covers a wide range of research activities and its focus includes such topics as technology development for

food processing and distribution food safety, scientific evaluation of food and food components in relation to human health, and the identification and utilisation of new functionalities found in living organisms.

*Further information:*

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<http://www.unu.edu/capacitybuilding/shortcourses.html>

### *Biotechnology*

The UNU Programme for Biotechnology in Latin America, located in Caracas, Venezuela, focuses on modern biotechnology-related health issues, bioethics, biosafety, bioinformatics and genomics. The overall objective of the programme is to promote the development of biotechnology in Latin America through research and academic exchange. These academic exchanges are carried out through the awarding of fellowships for research and advanced training in leading biotechnology laboratories within the region and also through the conduct of short training courses. These training courses are aimed at

young scientists and technicians, both from academia and the private sector. The programme also assists in the establishment of links between biotech institutions in the developed world and similar institutions in Latin America. A specific effort is also made to better inform countries within the region of existing biotechnology resources that could be used to promote technology transfer.

#### *Further information:*

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### *Science and Environmental Decision Making*

The political-scientific interface has emerged as one of the key dimensions of multilateral negotiations and environmental diplomacy. For this reason, the capacity of diplomats and other actors to access, understand, and deal with increasingly complex factual and scientific data is of critical importance. With this in mind, the UNU Institute of Advanced Studies has conducted a number of capacity development seminars aimed at providing negotiators from developing countries with better

access to, and a more in-depth understanding of, the key scientific issues that have become increasingly relevant to multilateral environmental negotiations. These seminars have focused on the issues of climate change, trade and the environment, and biodiversity and have taken place primarily in the ASEAN and MERCOSUR regions.

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### *Leadership*

Leadership is critical to resolving conflicts, building peace, protecting the environment, reducing poverty, and ensuring sustainable development. The art and skills of leadership, its ethics and values, and the tasks and competencies required to make good leaders in a national, regional and global context are in pressing demand. The UNU Leadership Academy in Amman, Jordan, is dedicated to the task of imparting leadership education to outstanding mid-career men and women from around the world through intensive courses encompassing theoretical and experiential learning. This task is undertaken with a view to the

particular needs of developing countries. This translates into an emphasis on the issues of crucial importance to the developing world, such as sustainable development, and also an effort to solicit a high level of course participation from developing country representatives.

Some of the more recent activities have included a three-week intensive leadership for poverty reduction course held in September 2001 and a leadership training course for African women entrepreneurs that was held in Ghana in 2001. This latter course built upon a UNU Institute for Natural Resources in Africa study on

African women who have succeeded as professionals and entrepreneurs in natural resources management enterprises. Previous courses have focused on such issues as disaster management.

*Further information:*

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### *Degree-Oriented Programmes*

UNU helps to upgrade the academic qualifications of young researchers, particularly from developing countries, through three types of programmes: Ph.D. internships, programmes that lead to the award of a degree, and postdoctoral fellowships.

UNU Ph.D. Internships provide Ph.D. candidates who have been accepted in Ph.D. programmes, particularly at universities in developing countries, with the opportunity to conduct part of the research for their dissertation at one of UNU's research and training centres. Interns gain access to the latest scientific information, receive expert advice from the academic staff of the institute and can link up with the wider academic community at the location of the institute. These interns take up short-term positions at several UNU research and training centres including: the UNU World Institute for Development Economics in Helsinki, Finland, the UNU Institute of Advanced Studies in Tokyo, Japan, which focuses on sustainable development research, and the UNU Institute for New Technologies in Maastricht, the Netherlands, which conducts policy research on the economic and social impact of new technologies in the developing world.

UNU currently supports three degree-oriented studies programmes. Fellowships for Masters and Ph.D. studies in the field of

Science and Technology for Sustainability are available at the Kwangju Institute for Science and Technology. Once every biennium, UNU awards fellowships to students, mainly from anglophone Africa, to participate in the two-year postgraduate training programme in nutrition planning offered within the framework of the Applied Nutrition Programme at the Department of Food Technology and Nutrition of the University of Nairobi, Kenya. The UNU Institute for New Technologies in Maastricht and the Maastricht Economic Research Institute on Innovation and Technology, a division of the University of Maastricht, have, since 1995, jointly offered a Ph.D. programme on the economic and policy dimensions of technical change.

Postdoctoral fellowships are newly available at the UNU Institute for Advanced Studies for research in the areas of biodiversity, biosafety and sustainable development; information technology for the environment; ecosystems and socio-economic impacts; urban ecosystems; and ecosystems and multilateral institutions. Roughly 80 percent of these positions are awarded to suitably qualified candidates from developing countries.

*Further information:*

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### *Water Virtual Learning Centre*

UNU International Network on Water, Environment and Health (UNU/INWEH), in collaboration with the UN Department of Economic and Social Affairs (DESA) is developing an Internet-based "Virtual Learning Centre for Water". This initiative will

provide distance learning opportunities and information on best water management practices for developing countries. INWEH is designing and developing a yearlong training curriculum on Integrated Water Resource Management

(IWRM), together with the supporting information technology system. The curriculum will be disseminated through a global electronic network of regional and national training institutions, the first components of which will be established in Africa and the South Pacific. The programme will be aimed at practicing professionals in the water sector wishing to upgrade their knowledge of modern water management concepts and practices. Once in place, the core curriculum will be customized to regional needs. Course materials will be electronically transcribed and placed on the WVLC website and CD-ROMs. The regional training network will provide train

the trainer 'courses and promote self-paced distance learning. UNU diplomas will be given, with an online examination system provided for remote students. The long-term goal is a 'tiered' course structure that includes the core curriculum (with custom elements for each region); a subset and rearrangement of the core curriculum to give short courses for non-water professionals; and a series of advanced courses for water specialists.

*Further information:*

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*Virtual University*

In 1996, the UNU Institute of Advanced Studies initiated the Virtual University project. More recently, from 2000 onwards, UNU, UNEP, Agder University College and a number of universities across the globe have been collaborating in the development of a Global Virtual University on Environment and Development. The initiative promotes the co-development of online courseware on environment related themes between institutions and experts from the North and South. A decentralised delivery system is being developed for courseware through collaborating institutions in the developing world supported by

mechanisms to ensure face-to-face interaction between students and lecturers initially via the Norwegian University system. Provision will also be made to ensure enhanced access for learners to environment related information from within the UN system and its networks utilising products and processes including UNEP's groundbreaking Global Environmental Outlook 2000 report.

*Further information:*

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*Project-Based Training*

The concept of integrated capacity development includes the numerous training seminars and workshops that are conducted in direct connection with ongoing UNU research and capacity development projects. In the past, a number of UNU research and training centres and programmes have engaged in a large number of these types of ad hoc capacity development activities, the details of which can be found on each centres website.

One of the most recent non-regular capacity development activities was a workshop for integrated approaches to the biosafety of genetically

modified organisms, organised by the UNU Institute of Advanced Studies and held in Jakarta, Indonesia, in 2001. UNU/IAS also conducts a short training programme that seeks to enhance the skills, tools, and knowledge of various stakeholders vis-à-vis recent advances in environmental research and management. These courses are conducted in collaboration with regional academic institutions such as the Asian Institute of Technology and normally target mid-career academics, government officials, and personnel from non-governmental organisations, particularly from developing countries.

In close connection with their research work, UNU research and training centres assist institutions of higher learning in developing countries to upgrade their teaching curricula. Some of the most recent efforts in this regard have included the UNU Institute for Natural Resources' development of a modular postgraduate training course in environmental management and policy analysis for use by universities in Africa and also the support offered by the UNU Institute for Software Technology to universities in the development of curricula for computer science departments.

UNU also cooperates with international and national organisations to upgrade capacity development strategies in their fields of work: UNU/INWEH, for example, as a

member of a new water coalition called "W-E-T" (Water, Education and Training) co-organised an international symposium on human capacity development in the water sector in Delft, the Netherlands, to feed into the World Summit on Sustainable Development and the Third World Water Forum. The UNU Food and Nutrition programme has also conducted a number of workshops in Africa aimed at identifying strategies for capacity development in nutrition leadership, which will be followed up in the coming years with various capacity development initiatives.

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*Information for Decision Making*

Biodiversity

UNU and UNESCO jointly offer a two-week international training course on coastal biodiversity in mangrove ecosystems at the Center of Advanced Study in Marine Biology of Annamalai University in Tamil Nadu, India. The course provides training in the methodology for assessing, monitoring and conserving biodiversity in mangrove ecosystems for young professionals with a postgraduate degree in marine sciences or a closely related field. UNU also cooperates with the

University of Ghent to offer professionals in the fields of monitoring, conservation and management of biological diversity in developing countries in-depth training to broaden their theoretical knowledge and practical capabilities.

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Food Composition Data

Compilations of data on the nutritional composition of foods are essential tools for nutritionists, especially those concerned with studies of nutrient intake in populations and at the individual level as well as for those involved with feeding large numbers of people or designing diets for people with specific needs. Since 1995, UNU has cooperated with the Food and Agriculture Organisation to offer courses to those involved in nutritional database programmes as analysts and/or compilers, those teaching nutrition and nutritional aspects of food chemistry as well as users of

nutritional databases who wish to have a better understanding of how databases are prepared and the constraints upon their use. Courses have been held at Wageningen Agricultural University in the Netherlands and also in Chile in 1995, in Argentina in 1996, in South Africa in 1997 and 1999, and in Jamaica in 2001.

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# United Nations University Global Reach

## Programmes at UNU Centre, Tokyo, Japan

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Peace and Governance Programme (Vice-RectorP&G@hq.unu.edu)  
Environment and Sustainable Development Programme (suzuki@hq.unu.edu)  
Capacity-building and Fellowships (yokota@hq.unu.edu)

## UNU Research and Training Centres or Programmes (RTC/Ps)

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**UNU Institute of Advanced Studies (UNU/IAS)**, Tokyo, Japan  
Focus: strategic approaches to sustainable development; E-mail unuias@ias.unu.edu  
URL <http://www.ias.unu.edu>

**UNU World Institute for Development Economics Research (UNU/WIDER)**, Helsinki, Finland  
Focus: development economics; E-mail wider@wider.unu.edu  
URL <http://www.wider.unu.edu>

**UNU Institute for New Technologies (UNU/INTECH)**, Maastricht, The Netherlands  
Focus: socio-economic impacts of new technologies; E-mail postmaster@intech.unu.edu  
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**UNU Institute for Natural Resources in Africa (UNU/INRA)**, Accra, Ghana  
Focus: natural resources management; E-mail unuinra@ghana.com  
URL <http://www.unu.edu/inra>

**UNU International Institute for Software Technology (UNU/IIST)**, Macau, China  
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URL <http://www.iist.unu.edu>

**UNU Programme for Biotechnology in Latin America and the Caribbean (UNU/BIOIAC)**, Caracas, Venezuela  
Focus: biotechnology and society; E-mail: unu@reacciun.ve  
URL [http://www.unu.edu/capacitybuilding/Pg\\_biolac/pg.html](http://www.unu.edu/capacitybuilding/Pg_biolac/pg.html)

**UNU Leadership Academy (UNU/LA)**, Amman, Jordan  
Focus: leadership development; E-mail: un2@ju.edu.jo  
URL <http://www.unu.edu/la>

**UNU International Network on Water, Environment and Health (UNU/INWEH)**, Hamilton, Canada  
Focus: water, environment and human health; E-mail: contact@inweh.unu.edu  
URL <http://www.inweh.unu.edu>

**UNU Programme for Comparative Regional Integration Studies**, Bruges, Belgium  
Focus: local/global governance and regional integration; E-mail: info@cris.unu.edu  
URL <http://www.cris.unu.edu>

**UNU Food and Nutrition Programme for Human and Social Development**, Cornell University, USA  
Focus: food and nutrition capacity building; E-mail: Cg30@cornell.edu  
URL [http://www.unu.edu/capacitybuilding/Pg\\_foodnut/cornell.html](http://www.unu.edu/capacitybuilding/Pg_foodnut/cornell.html)

**UNU Geothermal Training Programme (UNU/GTP)**, Reykjavík, Iceland  
Focus: geothermal research, exploration and development; E-mail: os@os.is  
URL <http://www.os.is/unugtp/>

**UNU Fisheries Training Programme (UNU/FTP)**, Reykjavík, Iceland  
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URL <http://www.unu.edu/iceland/fisheries/fisheries.html>

**Centre for International Conflict Research (INCORE)**, Londonderry, United Kingdom  
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The United Nations University was established by the United Nations General Assembly in 1972 to be an international community of scholars engaged in research, advanced training, and the dissemination of knowledge related to pressing global problems of human survival, development and welfare. Its activities focus mainly on the areas of peace and governance, environment and sustainable development, and science and technology in relation to human welfare. The University operates through a worldwide network of research and postgraduate training centres, with its planning and coordinating headquarters in Tokyo.



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