CHAPTER 8

Redirecting education, public awareness and training for sustainable development

Introduction

If sustainable development is to be achieved, it will require the appropriate development of human capacity. Agenda 21, adopted at the UN Conference on Environment and Development, held in Rio de Janeiro in June 1992, acknowledged that the ability of a country to pursue sustainable development is determined by the capacity of its people. Any policies for environmental conservation, natural resource management or sustainable development, require the public and policy-makers to be sufficiently sensitised to environment and development implications and their significance in the national policy agenda. Implementation of such policies also requires administrative, managerial and technical knowledge, expertise and skills, and the public's support. Awareness and understanding of environmental issues provide a basis and rationale for commitment and meaningful action by all stakeholders towards environmentally-sound and sustainable development. Human resources are the key agents to achieving sustainable development.

It is important to recognise that human capacity for sustainable development is currently insufficient, particularly in developing countries. Further efforts for development are clearly needed. It is widely discussed that human capacities can be developed and enhanced through a broad range of educational means, such as formal and non-formal education, training and public awareness raising. Pertinent practices are widespread in various forms of education in the Asia-Pacific region and in other parts of the world. Significant emphasis has been placed on environmental education addressing sectoral concerns, such as forest conservation, water efficiency, waste management, energy efficiency and corporate management. The philosophy, critical players and targets, specific subject focusses and operational methodologies have been discussed over decades for these educational measures. Yet, questions still remain as to whether, or to what extent, these educational measures have contributed to the overall efforts towards attaining sustainable development, and which policy measures should be introduced and applied to improve such a contribution. The purpose of this chapter is to provide a preliminary assessment on both the scope and the current status of educational measures as a tool to achieve an environmentally-sustainable Asia, and based on this assessment, to put forward primary recommendations on the policy interventions to improve the performance of such educational measures in the Asia-Pacific countries.

Regional trends and experiences

Global and regional consensus – A primary tool for achieving sustainable development

As broadly discussed in Chapter 1, environmentally-sustainable development will be best achieved through the adoption and implementation of an appropriate policy mix for environmental management, which essentially includes the elements of capacity development. The role and function of the educational measures, including various forms of education, public awareness and training, has been widely discussed in various forums, and their importance has already been well recognised at global and regional levels.

Agenda 21, first emphasised that education is linked to virtually all areas of sustainable development issues and concerns, and educational measures, including formal education and public awareness training should be recognised as critical for promoting sustainable development and improving the capacity of the

people to address environment and development issues (United Nations, 1992).

The International Conference on Environment and Society: Education and Pubic Awareness for Sustainability, organised by UNESCO in Thessaloniki, Greece, in 1997, elaborated the function of education in contributing to achieving sustainable development. It equated education to the driving force or the most effective means that society possesses for confronting the challenges of the future and articulated that the goal of education is to make people wiser, more knowledgeable, better informed, ethical, responsible, critical and capable of continuing to learn. It furthermore stated that "education serves society by proving a critical reflection on the world, especially its failings and injustices, and by promoting greater consciousness and awareness, exploring new visions and concepts, and inventing new techniques and tools. Education is the means for disseminating knowledge and developing skills for bringing about desired changes in behaviours, values and lifestyles, and for promoting public support for the continuing and fundamental changes that will be required if humanity is to alter its course, leaving the familiar path that is leading towards growing difficulties and possible catastrophe and starting the uphill climb towards sustainability. Education, in short, is humanity's best hope and most effective means in the quest to achieve sustainable development" (UNESCO, 1997).

The Johannesburg Plan of Implementation (JPOI) adopted at the World Summit on Sustainable Development, held in Johannesburg, South Africa in September 2002, emphasised that education is critical for promoting sustainable development, in particular, in eradicating poverty, improving health and protecting and managing the natural resource base for economic and social development. The plan called for actions essential to mobilise necessary resources, including financial resources at all levels, to complement the efforts by national governments to pursue their goals and actions (United Nations, 2002a).

At the regional level, environmental ministers of countries in Asia and the Pacific adopted the Regional Action Programme for Environmentally Sound and Sustainable Development in Asia and the Pacific (RAP) 2001-2005 at the fourth Ministerial Conference on Environment and Development (MCED2000) in Kitakyushu, Japan in September 2000. This Regional Action Programme strongly affirmed the critical importance of environmental education, public awareness and training in promoting sustainable development in Asia and the Pacific, and called for further intensifying all levels of educational efforts, not simply targeting environmental protection, but also focussing on broader issues of sustainable development, such as the importance of human dignity; the removal of illiteracy; the improvement of the quality of life and the environment while promoting a culture of peace, solidarity and international understanding; the diversity of life and the balance between reasonable human activities and the need to preserve natural ecosystems; and building overall human capacities promoting participation and cooperation among people and institutions (UNESCAP, 2000a). These views have been reinforced by the Phnom Penh Regional Platform on Sustainable Development for Asia and the Pacific, adopted at the High-level Regional Meeting for WSSD, held in Phnom Penh, in November 2002, referring to the capacity-building across all sectors as a cornerstone in the achievement of sustainable development in the region, using better education and training and the creation of public awareness. Particular importance was placed on the common needs in developing countries in the region, of capacity for self-empowerment of local communities and for understanding and articulating the increasing number of national legal and institutional measures and international conventions/agreements, and securing better compliance and enforcement of these laws and conventions (UNESCAP, 2002).

Progress in the efforts and practices of environmental education

Together with the increasing recognition of education as a critical driving force for sustainable development in Asia and the Pacific, education efforts and practices have been progressively promoted and expanded in both quantitative and qualitative terms in the region. It is clear that a new surge of enthusiasm

and activities is underway on many fronts to place education, public awareness and training higher on the public agenda in different parts of the region, in particular, in the field of environmental education (UNESCAP and ADB, 2000).

An IGES report, "Environmental Education in the Asia-Pacific Region – Status, Issues and Practices" (Bhandari and Abe, 2001), provided for the first time a comprehensive review of the overall status of ever-growing environmental education sectors and their practices in the countries of the Asia-Pacific region. The review was based on status reports from thirty-four countries and two special areas in the region, in which most countries reported the development of the environmental education sectors and programmes at the national and the local levels. The review illustrated that the countries of the region showed significant interest in incorporating environmental concerns into formal, non-formal and other educational programmes, and that governments, NGOs, educational institutions, communities and the media of the region had gained remarkable competence in delivering environmental education programmes, despite a number of difficulties, such as resource constraints, persistent poverty, rising populations and social development problems. Box 8-1 illustrates some highlights of the country status reports from the 2001 review and subsequent IGES research.

As for the regional trend, UNESCAP analysed that in Asia and the Pacific efforts to promote environmental education focussed on upgrading school education, development and networking of non-formal education groups, and training in environmentally-sound technology. The analysis also highlighted that numerous reference and resource materials, curriculum structures, learning sequences and corresponding training outlines were becoming increasingly available. Such materials are developed by a range of governmental, educational, scientific and socially-active organisations, and directed to different groups, for example, schoolchildren, teachers, university students and lecturers, organisers of non-formal environmental education activities, various government officials, government planners, engineers, industrial managers and the general public (UNESCAP, 2000a, 2000b).

Recognition is growing that many environmental issues and challenges are common to more than one country and that countries and communities can learn from each other in their responses to similar situations and problems. Transboundary cooperation in the field of environmental education has demonstrated impressive progress in the past decade. Examples at the sub-regional level include SPREP's Action Strategy for Environmental Education and Training in the Pacific Region 1999 - 2003, ASEAN Environmental Education Action Plan 2000 – 2005, SACEP's South Asia Environmental Education and Training Action Plan 2003 – 2007, Tripartite Environmental Education Network for China, Japan and the Republic of Korea (TEEN). At the regional level, the Asia-Pacific Network for Tertiary Level Environmental Training (NETTLAP) can be referred to as a pioneering initiative which has been operational since 1993, contributing to human resource development and the strengthening of tertiary institutions in the entire Asia-Pacific region.

Box 8-1: Highlights of environmental education (EE) development in selected Asia-Pacific countries

Japan – Following an increase in public protests against severe industrial pollution (*kogai*) in the 1950s and 1960s, the Ministry of Education revised the "Course of Study," or the basic national guidelines for school education in 1967 to first include the concept of pollution and public nuisance in the school education curriculum. Its 1989 revision saw the introduction of a new subject called "Life Environmental Study" in the primary school curriculum, following the drive of naturalist movements and the escalation of environmental education in late 1980's. Another revision in 1998 announced the creation of a new course subject "Period of the Integrated Studies" (*Sogo Gakushu no Jikan*) and provided an institutional basis to incorporate an NGO and community-based, non-formal environmental education into the school curriculum. This, together with the Environmental Education Promotion Law, put into effect in 2003, bestowed a new momentum to environmental education in formal education in Japan. EE activities by NGOs have steadily increased and intensified since the late 1970's and are gaining partnership with other sectors, such as business and the media, in addition to the formal education sector as stated above.

Australia – Environmental education is considered a crucial part of ecologically sustainable development in Australia. The Australian government developed a National Action Plan for Environmental Education in 2000 after consultation with stakeholders and has since implemented all the plan's major initiatives. Under the plan, a National Environmental Education Council was formed, consisting of eminent persons and EE experts from all sectors. The council provides advice on EE to the federal minister for the environment and its work is supported by specialist sub-groups. The plan also acknowledges the need for further research on EE. This has been addressed through the establishment of the Australian Research Institute in Education for Sustainability (ARIES). A function of ARIES includes feeding information to environmental education initiatives, and federal policy brings about change towards sustainability through an action research approach. Environmental education and more recently, education for sustainable development in Australia has extended beyond formal education to encompass higher education, industry and business, communities, government and special interest groups.

Indonesia – Environmental education began in the early 1960s and is being used to increase public knowledge, attitudes and skills on environmental issues and matters. Environmental study centers (ESCs) have been established to help teachers, principals and educators become environmentally competent. The "greening" of the curriculum has become important to environmental education pioneers. The government views environmental education as fundamental in all forms of learning. After the economic crisis of 1997, the government began to provide block grants to the poorest 40 per cent of primary and junior secondary school students, and scholarships to high-risk junior secondary school students.

Bhutan – Bhutan's Five-Year Plan (1998-2002) emphasises environmental education and awareness in the national environmental curriculum. A new approach to primary education (NAPE) has been developed for Bhutanese children using a national curriculum oriented towards the observation of nature, conservation and sustainable use of renewable resources. This national curriculum contains a unit on environmental studies. Upper primary and secondary curricula build on the base created by a lower primary curriculum, are oriented towards the goal of sustainable development.

Source: Bhandari and Abe (2001) with supplementary updates by authors

Box 8-2: Sub-regional cooperation in promoting environmental education - A case of SPREP action strategy

In 1998, the South Pacific Regional Environment Programme (SPREP) developed the "Action Strategy for Environmental Education and Training in the Pacific Region: 1999-2003." Reflecting the thematic focus of environmental issues in this sub-region, the Action Strategy put emphasis on marine and coastal resources management. A review has been conducted since 2003 to determine the extent to which the Action Strategy has been implemented, and to establish the future direction of environmental education and awareness in the sub-region, with particular reference to the UN Decade of Education for Sustainable Development. The review noted the potential in the majority of Pacific island countries and territories (PICTs) for development and production of education and awareness resource material. However, it also pointed out that there is a need for training in appropriate techniques/methodologies that will lead to attitudinal and behavioural change. Attitudinal and behavioural changes have seldom been used as indicators of success in environmental education and awareness projects in the past. The review proposes the need for further development of the strategy so as to be better aligned with the concept of ESD. It also proposes a continuing focus on the implementation and monitoring of the current strategy rather than expending resources on a major revision of the strategy.

Source: SPREP (2003)

Progress in improving access to primary education

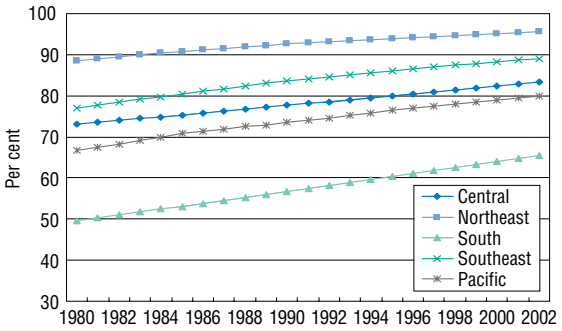
With the perspective of "education for all," it carries a particular importance in providing basic education to the majority of the population, which is no doubt the key to a nation's ability to develop and achieve sustainability targets, particularly through the improvement of literacy and numeracy. Improving access to primary education has been a critical challenge to a number of the developing countries in the region. It has been observed that efforts during the past three decades have brought about a remarkable improvement in people's access to education in Asia and the Pacific. The rate of access to primary education, itself as a direct target of the Millennium Development Goals (MDG), has been improved with more than 95 per cent of children between 6 and 11 years of age now attending school, including those in the three most populous countries of China, India and Indonesia (UNDP, 2003). East Asia and the Pacific has demonstrated a reasonable advance despite some stagnation associated with the Asian financial crisis in late 1990's, and will have a fair chance to achieve the MDG target by 2015. South Asia, however, is experiencing more difficult challenges. On the other hand, as gender is also a MDG target, particular attention should be paid to the gender gaps in primary and secondary education. Gender gaps in many countries still require urgent improvement. Despite drastic improvement during the last two decades, school enrolment rates for girls are significantly behind those of boys, which resulted in a literacy rate of only 55 per cent in 2002 for women in South Asia which is notably lower than other sub-regions (APFED, 2005).

Positive impacts of education in advancing to sustainable development

With significant improvement in the access to educational opportunities, a constantly improving literacy rate has been observed in all sub-regions. Literacy, together with other common curricula like mathematics, science, health and physical education and social studies, should certainly serve as the basis of subsequent capacity development aiming at the attainment of sustainable development, as a country's "basic intellectual infrastructure."

Research has shown that basic education provided in primary and secondary schools effectively improves

Fig. 8-1: Literacy rates of adults by Asian sub-region



Source: APFED (2005)[34]

agricultural productivity, enhances the status of women, reduces population rates, enhances environmental protection and generally raises the standard of living. For example, four to six years of education is the minimum threshold for increasing agricultural productivity. Literacy and numeracy allow farmers to adapt to new methods, cope with risk and respond to market signals. An average of six to eight years of public education for women is required before the birth rate drops and infant health and children's education improve. Nine to twelve years of education is required before industrial productivity increases nationally (Heyn, Lythgoe and Myers, 1997).

On the environmental education front, the impacts can also be seen not only as enhancing awareness of participants or enhancing their knowledge level, but also formulating of concrete actions leading to, inter alia, the improvement in environmental quality, bettering the management of institutions and the promotion of participatory decision-making for natural resource management, in particular, at the local level. A number of reported practices of environmental education provide encouraging signs of the positive outcomes from education, in terms of concrete contributions to achieving sustainable development. Boxes 8-3 and 8-4 illustrate exemplar cases from the Asia-Pacific region, while the McKenzie-Mohr and Associates database provides a number of success stories, mainly from the United States, on the application of educational measures for achieving improvement in environmental performances at the local level (McKenzie-Mohr and Associates, 2005).

Box 8-3: Enhanced awareness promoted household waste recycling and reduction of waste generation - Thailand

The municipality of Nonthaburi, located on the outskirts of Bangkok, has experienced the rapid expansion in consumption associated with significant increases in household waste generation, which led to numerous problems, such as the shortage of final disposal sites, high cost of treatment and disposal, and deterioration in environmental hygiene due to imperfect collection and the scattering of waste. Within the framework of the Kitakyushu Initiative for a Clean Environment under the auspices of the UN Economic and Social Commission for Asia and the Pacific (ESCAP), and with technical assistance of the Institute for Global Environmental Strategies (IGES), the municipality carried out a pilot project to reduce household waste and promote recycling in two villages, primarily through non-formal education and a public awareness campaign.

With an overall objective of increasing recycling rates by 20 per cent and reducing solid waste by 30 per cent, Nonthaburi conducted various activities to promote public participation, including the organisation of seminars and workshops, and production and distribution of pamphlets providing clear explanation of the scope and objective of waste recycling and practical guidance for waste segregation in plain language. Transparent plastic bags were distributed to promote public consciousness on proper waste segregation. These activities have been carried out with significant enthusiasm and distinctive ingenuity by the municipality staff, who were inspired and motivated by successful experiences of other cities in the region (e.g., City of Kitakyushu, Japan), that they learned through the international training events organised as a function of the Kitakyushu Initiative.

The pilot project resulted in an apparent increase in the level of environmental awareness among the residents. An investigation conducted six months after implementation indicated that recycling has increased from 5.3 per cent to 22 per cent, and waste underwent a 32 per cent decrease from 0.95kg/day to 0.65kg/day. Income from recycled materials, e.g., metals and plastics, amounted to 1630 baht/month provoked further awareness of multiple benefits of waste recycling among the citizens.

Source: Nonthaburi Municipality (2003)

Box 8-4: Informal learning promotes participation of villagers in marine resource management – Vanuatu

In Vanuatu, a local drama group, Won Smolbag, is showing how difficulties encountered in disseminating information can be overcome in a way well accepted by local people. They engage people in drama workshops and the novel experience of watching live theatre.

Literacy and education levels in Vanuatu are low, and many of its villages are unable to access information through the media. Following dramas practiced by participants, workshops allow participants to share their concerns and knowledge about a range of social, environmental and health issues in both an entertaining and engaging way.

Won Smolbag is helping villages not only to build knowledge, but also to take action by connecting them with the government and NGOs to deal with important and often controversial issues like marine exploitation through the illegal trade of marine species. In this way, the innovative programme is helping to build their capacity for participation in the change toward sustainability.

Source: Tilbury and Wortman (2004)

Problems of environmental education

Along with the proliferation of environmental education practices throughout the region, information and knowledge-based on practical experiences are progressively exchanged and fed back to the discussion for further improvement of education programmes and their delivery. An IGES workshop on the Regional Strategy on Environmental Education in the Asia-Pacific Region, held in December 1999, was a landmark event where experts from the entire region gathered and discussed the issues and problems related to the delivery of environmental education at different levels (IGES, 2002). Most of the major problems of environmental education, in particular those encountered at the operational level, were already raised in the workshop. Some of those problems included:

Inadequate educational infrastructure – A lack of appropriate infrastructure is very common in the education sector in developing countries in the region. School buildings are often dilapidated and lack minimum facilities, such as furniture, classroom, laboratories, library, materials, tools and equipment. Because of a lack of designated space, non-formal classes are being operated in shifts.

Inadequate curriculum development – Existing curricula, in particular, in school education, are mostly knowledge-based and inflexible in incorporating additional subjects or activities to involve students in a broader perspective of leaning on ecological sustainability in locally-relevant contexts. In most EE programmes, curricular components are often dominated by the natural sciences and do not reflect the multi-disciplinary characteristics of environmental education, nor are they constructed around accurate scientific or ecological concepts.

Lack of trained teachers – There is a great shortage of trained and competent human resources, especially environmental educators and facilitators. The lack of training opportunities that focuss on content and methodology of environmental education, as well as incentives to motivate teachers to enhance their competency, is significant.

In fact, these were considered the areas where policy intervention and support are definitely required. In effectively addressing these problems, the workshop discussion and subsequent IGES studies have identified the needs of overall policy intervention, in particular, for:

(i) Enhancing the integrity of national policy/strategy for environmental education, which provides a basic principle for guiding the broad range of environmental education activities in a country in an integrated and coordinated manner;

(ii) Improving the institutional coordination among different educational sectors and the governmental agencies to ensure that financial, technical and human resources are appropriately mobilised and allocated to support the sound development of an education infrastructure and curricula as well as training/capacity-building activities targeting different sectors; and,

(iii) Enhancing the availability of, and facilitating access to, relevant data and information, especially on environmental trends, conditions, solutions and alternatives.

Most of these problems and policy requirements are not specific to environmental education. The findings in the EE field are largely relevant to the cases of thematic education in other subject areas addressing the important components of sustainable development, such as poverty, health, social cohesion, and local development, and thus can be applied to the further promotion of those thematic education efforts.

A fundamental question - education and sustainable development at society scale

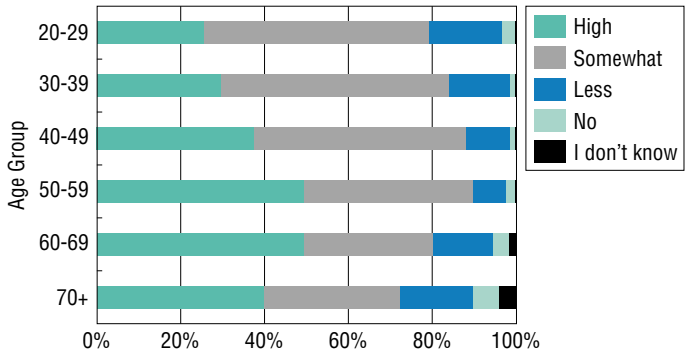
As previously mentioned, positive signs of the contribution by educational efforts to the promotion of sustainable development can be observed in a number of specific initiatives and practices. However, for cases of environmental education in particular, their impacts are observed mainly at the individual, group, community and local levels, and their influence on society-wide change is still unclear.

A survey conducted by the government of Japan in 2001, provided an insightful analysis about the outcome of environmental education. As the survey was designed to canvass inter-generation differences in people's attitude towards global environmental issues after more than 30 years of history of environmental education (EE) activities, the results show that the older generation, in particular "pre-EE generation" from 50 to 58 years old, still have a greater concern for global environmental issues than younger generations, including the "EE generation" from 20 to 29 years old (Fig. 8-2).

Recent research in Australia similarly focussed on the relative lack of concern expressed by younger Australians with the need to protect the natural environment. New polling data showed that young Australians were among the least concerned group in the country (Denniss, 2005).

The result can be interpreted in many ways. It is, however, interesting to see that in the two most advanced countries in EE development in the Asia-Pacific region, EE may not necessarily be producing environmental awareness effectively for its target audience. With respect to environmental protection or the rational management of natural resources, behavioural change cannot be expected when environmental awareness is not sufficiently raised.

Fig. 8-2: Inter-generation comparison of the levels of concern for global environmental issues



Source: Cabinet Office, Government of Japan (2001)

In its national efforts to comply with the Kyoto target (6 per cent reduction of GHG emissions), Japan has put significant emphasis on education, training and public awareness as a tool to control GHG emissions from residential sources, as clearly presented in Japan's Third National Communication under the United Nations Framework Convention on Climate Change (Government of Japan, 2002a). Substantial media coverage has been evoked by this subject while a number of media campaigns follow the government's initiatives that call on the general public for energy-consciousness and energy-saving behaviour in everyday life. In line with the above provision, Japan's "Guideline for Measures to Prevent Global Warming" (2002) proposed that CO_2 emissions from residential sources should be reduced by 2 per cent by 2010 (compared with the emissions in the base year 1990), particularly through the expanded application of energy-saving and

energy-efficient equipment supported by accelerated R&D in industry and the environmentally-conscious consumers (Government of Japan, 2002b). However, following the steady increase of CO_2 emissions from residential sources, e.g., +33.0 per cent in 2002 compared with the baseline value in 1990, the 2005 revision of the guideline saw the setting of a "realistic" goal of CO_2 emissions from residential sources, which will be a 15.1 per cent increase by 2010, instead of a 2 per cent reduction (Government of Japan, 2005).

The revision may also be interpreted in many ways, but one possibility would be that the government of Japan has given up on the idea that GHG emissions from residential sources can be reduced by intensively applying educational measures as a tool to provoke consumers' behavioural change. Or, in the first place, energy-saving behaviour/practices at the personal level were not regarded even in the 2002 guideline. It is apparent that the government implicitly admitted that such measures cannot be expected to work out as much as previously expected.

Table 8-1: Outlook of Japan's sectoral emissions of CO_2 from energy sources in 2010

By sector	Base year emission (1990)	Reduction goal set by the 2002 guideline	2002 actual emissions	Reduction goal (revised) set by the 2005 guideline
Industry	476 million t-CO_2	-7%	-1.7%	8.6%
Residential	**273 million t-CO_2**	**-2%**	**+33.0%**	**+10.7%**
Transportation	217 million t-CO_2	+17%	+20.4%	+15.1%

Source: Government of Japan (2005)

Challenges in reassessing relevance and effectiveness

Discussions so far illustrate that education, public awareness and training measures may be effective in improving environmental quality and natural resource management, and thus in promoting sustainable development, mainly at the local level. However, fundamental questions remain on how educational efforts should effectively produce tangible impacts on values and behaviours of the target audience that explicitly relate to the promotion of sustainable development at the societal scale. Yet it has to provide factual evidence on whether, how and how much educational measures can contribute to achieving sustainable development in concrete terms, e.g., attainment of MDG targets in 2015.

It has been claimed that human resource development is the key to achieving sustainable development. Despite sovereign philosophy and mounting expectations, if there is no evidence to support the actual contribution of education, public awareness and training measures to this societal challenge at tangible levels and scales, it must imply that the orientation of environmental education for a past decade needs a serious re-examination. Maybe the efforts were not sufficient to realise a visible change, or perhaps more resources should be allocated to intensify, expand and upgrade the current initiatives. The current policies focus and direction of environmental education might need some readjustments. Thorough reassessment of the methodology, contents and magnitude of delivering environmental education, or education for sustainable development in broader terms, would be worth further research in terms of defining its concrete contribution to sustainable development.

Reorientation towards sustainable development

In response to the problems and challenges described in the previous section, it is certain that redirection is needed in applying educational measures in the societal efforts to achieve sustainable development, and new approaches and initiatives are desired. This section will present selected responses emerging globally, as well as in the region, and present several important principles in forming a new direction for education, public awareness and training for sustainable development in Asia and the Pacific.

Beyond environmental education

With growing recognition of unavoidable interaction among environmental, economic and social concerns, environmental issues have been more progressively discussed in the broader context of sustainable development. The Johannesburg Declaration on Sustainable Development, adopted at the World Summit on Sustainable Development in 2002, explicitly highlighted the collective responsibility of all mankind to advance and strengthen the interdependent and mutually-reinforcing three pillars of sustainable development – economic development, social development and environmental protection – at the local, national, regional and global levels (United Nations, 2002b). This notion essentially implied a need for significant change in scope and orientation for environmental education, and for the emergence of a new vision of education for sustainable development.

A report of the UN Secretary-General to the Commission on Sustainable Development (CSD) in 2001 expressed a particular concern about the continuing misconception that sustainable development is mostly about the environment and that education for sustainable development is therefore perceived simply as a new twist to the notion of environmental education (United Nations Economic and Social Council, 2001). Experts viewed that environmental education, while remaining as an important and essential component of a newly emerging education for sustainable development, was required to drastically evolve itself from its naturalist, apolitical and scientifically-oriented into a focus on a broader agenda and a further understanding of the interlinking relationships among environmental quality, social welfare and economic livelihood, as well as the political threads that underlie these matters (Tilbury, 2000). This evolution will help environmental education to better address a more practical solution to the actual environmental problems in the existing socio-cultural and economic conditions and to enhance its relevance to promotion of sustainable development at the society scale.

In 2002, the proposal for establishing the Decade of Education for Sustainable Development (DESD) was endorsed at the World Summit for Sustainable Development (WSSD) in Johannesburg. The UN General Assembly later adopted the decade by consensus, designating the years of the decade as 2005-2014. The decade provides an opportunity for a concerted effort to integrate the various values inherent in sustainable development into every aspect of learning, through all forms of education, training and public awareness-raising, to encourage changes in behaviour that allow for a more sustainable society. Internationally collaborative work is under way aiming at the development of the International Implementation Scheme and subsequently the Regional Implementation Strategies (UNESCO, 2005a, 2005b).

Education for sustainable development covers far broader range of issues than the conventional scope of environmental education, reflecting the fact that sustainable development is a complex undertaking with connections to every aspect of life. Such issues include human rights, peace and human security, gender equality cultural diversity and intercultural understanding, health, HIV/AIDS, governance, poverty reduction, corporate responsibility and accountability, and market economy, in addition to environment-related sectoral subjects, i.e., natural resources (water, energy, agriculture, biodiversity), climate change, rural development, sustainable urbanisation, and disaster prevention and mitigation. However, the current discussion about education for sustainable development concentrates on a common approach and underlying principles

for dealing with a variety of issues, rather than discussing the operational components of educational programmes addressing specific topics. The key values to promote, key capacities to develop, and key operational features of education for sustainable development are being discussed by experts, education practitioners, academics and officials in different arenas. For example, the draft International Implementation Scheme for DESD proposed a list of key features of education for sustainable development (UNESCO, 2005a):

- ***Interdisciplinary and holistic:*** learning for sustainable development embedded in the whole curriculum, not as a separate subject;
- ***Values-driven:*** it is critical that the assumed norms – the shared values and principles underpinning sustainable development – are made explicit so that they can be examined, debated, tested and applied;
- ***Critical thinking and problem solving:*** leading to confidence in addressing the dilemmas and challenges of sustainable development;
- ***Multi-method:*** word, art, drama, debate, experience, … different pedagogies that model the processes. Teaching that is geared simply to passing on knowledge should be recast into an approach in which teachers and learners work together to acquire knowledge and play a role in shaping the environment of their educational institutions;
- ***Participatory decision-making:*** learners participate in decisions on how they are to learn;
- ***Applicability:*** the learning experiences offered are integrated in day to day personal and professional life;
- ***Locally relevant:*** addressing local as well as global issues, and using the language(s) that learners most commonly use. Concepts of sustainable development must be carefully expressed in other languages – languages and cultures express things differently, and each language has creative ways of expressing new concepts.

Obviously, these features are closely linked to the responses to the current problems of environmental education discussed in the previous section. The emerging thrust of education for sustainable development momentum for further development of environmental education through strengthening cross-sectoral collaboration with thematic education initiatives dealing with other subject issues of sustainable development. Such collaboration will be particularly useful in improving planning and the operation of education programmes through exchanging information and experiences, in enriching their multi-disciplinary contents in holistically addressing individual issues in the overall socio-cultural and economic contexts, and in mobilising fresh resources by synergetically fostering public support.

Box 8-5: DESD in Asia and the Pacific

The regional implementation of DESD in Asia and the Pacific has officially been launched by the ceremonial UNU/UNESCO International Conference: "Globalisation and Education for Sustainable Development," June 28-29, 2005, Nagoya University, Nagoya, Japan. To lead and facilitate the substantial activities by the various stakeholders throughout the region, UNESCO, in collaboration with the United Nations University, has developed "A Situational Analysis of Education for Sustainable Development in Asia-Pacific Region," and "A Working Paper: Asia Pacific Regional Strategy for Education for Sustainable Development" as basic guidance. Preliminary findings in these documents indicated that ESD is still predominantly conceptualised in the context of environmental education (EE) by many key stakeholders and decision-makers in the region. The analysis emphasised that "although much can be learned from the experience of successful EE initiatives, especially at the grassroots level, it is imperative that stakeholders understand the unique holistic and cross-cutting nature of ESD. Moving from EE to ESD will be a key challenge for the decade."

Source: UNESCO (2005b, 2005c)

Box 8-6: Tongji Institute of Environment for Sustainable Development addresses a broader perspective of sustainable development in the regional training programme

Tongji University, Shanghai, established with the assistance of the United Nations Environment Programme (UNEP), the Tongji Institute of Environment for Sustainable Development, which serves as a regional hub for high-level education and research on the environment and sustainable development. The institute provides a platform for inter-university cooperation, as a part of a collaborative effort of the Asia Pacific Regional University Consortium on Sustainable Development for, inter alia, exchanging information and experience, providing education and training opportunities and coordinating joint studies in pertinent fields, e.g., environmental and sustainable development policies, applicable teaching theory and practices, environmental management at universities and students' environmental activities in society.

As a regional initiative to respond to the emerging notion of education for sustainable development, in 2004, the Institute launched an annual training programme for leadership development targeting mid- to senior level officials from a wide range of stakeholders in government, civil society, private sector and the media in the Asia-Pacific countries. It was designed to deliver a deeper and more profound understanding of sustainability by highlighting a broader perspective of human, environmental and socio-economic implications of sustainable development as well as an imperative need for integrating them in a harmonised development agenda.

Source: UNEP (2004)

Responding to the comprehensive needs of human capacities for sustainable development

If sustainable development is to be attained and education is to function as a tool to achieve this ultimate goal, the relevance between education initiatives and their contribution to the promotion of sustainable development, as well as their effectiveness and efficiency should be seriously reconsidered. Since education fulfills this function, primarily through the development and enhancement of human capacity, it might be worthwhile to define key requirements for the human capacity that are critical for pursuing sustainable development.

Based on earlier works, such as the Tbilisi Declaration in 1977 and subsequent research, including Hopkins and McKeown (2002), the following four basic categories of capacity requirements essential for sustainable development are proposed:

(i) Capacity to communicate

Communication among people and, in particular, between different stakeholders, is the foundation for any democratic society and is essential for informed and participatory decision-making for sustainable development. Sharing common information and exchanging views are important elements for carrying out consultative and participatory approaches in all fields.

(ii) Capacity to understand

No actions can be adopted or implemented without the appropriate recognition of the implications or significance of specific measures in terms of social, economic and environmental well-being. Enhancing awareness and understanding on not only environmental matters and their socio-cultural and economic implications is critically important. Knowledge about relevant natural and social systems should be complemented with skills to actively collect, comprehend and analyse quantitative and qualitative information with appropriate world views, values and perspectives.

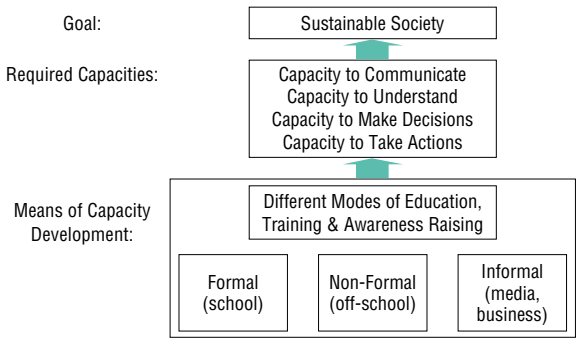
(iii) Capacity to make decisions

Decisions for sustainable development require understanding and critical thinking for multidimensional and multidisciplinary complexities. Skills are needed for the formulation of alternative options, study on socio-cultural and environmental implications and trade-offs among those specific options, and application of sustainable development principles, values and priorities in the decision-making. Capacity for facilitating partnerships and coordination among stakeholders with different views and perspectives is also critical to enhance the responsibility for decisions effecting a shared future.

(iv) Capacity to take actions

Ultimately, all values and decisions have to be interpreted into actions at different levels and scales. Actions may take the form of legislation and policy-making; application of economic and financial instruments; reform of institutions and enforcement processes; scientific and technological interventions; or more direct actions and behavioural changes at the grass-roots level, each of which requires specific implementation capacities and skills.

Fig. 8-3: A conceptual path – from education to the attainment of a sustainable society



Box 8-7: The Region's challenges in human capacity development for global environmental action

In 2000, the UNDP and the GEF Secretariat published a report advocating a comprehensive approach for developing the capacities needed at the country level to meet the challenges of global environmental action. The regional report "Capacity Development Initiative – Country Capacity Development Needs and Priorities," while placing a significant emphasis on the institutional aspects, identified the following areas for primary challenges for human aspects of capacity development in the Asia-Pacific region:

(a) Human resources across most environmentally related institutions are inadequate for effectively carrying out operations. There is generally a lack of technical staff in most institutions. Due to budgetary constraints and unattractive incentives, there is difficulty in retaining well-trained staff.

(b) There is a shortage of specialists in the required technical fields. For example, taxonomists and meteorologists.

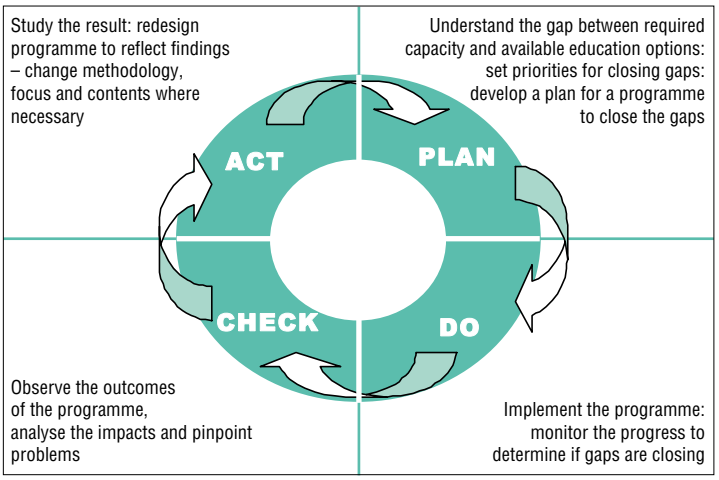
(c) The key areas where training programmes should be enhanced include, research on socio-economic impacts, policy implications, and vulnerability studies.

Source: Zakri, Singh and Villarin (2000)

All educational programmes need to be planned, designed and implemented with a clear reference to the desired target, i.e., the development of key capacities as identified above. In order to facilitate this process, an introduction of an evaluation process in the project cycle of any education programme is encouraged. A number of management tools and instruments are available for this purpose.

For example, the Plan-Do-Check-Act (PDCA) cycle is a commonly-used management tool that provides a framework for the improvement of a process or system. The cycle involves a four-step cyclic process consisting of Plan, Do, Check and Act stages, which enables the completion of one turn of one cycle to flow into the beginning of the next. A conceptual chart for the possible application of a PDCA cycle for an educational programme is presented in Fig. 8-4.

Fig. 8-4: PDCA cycle for an educational programme[35]



As mentioned, evaluation should offer a powerful way to improve education programmes and enable them to succeed in accomplishing more of their goals and objectives, moving values, changing behaviours and developing necessary human capacities in the direction of sustainability and environmental conservation. Despite the long debate on the difficulty of measuring the success of environmental education, outcome-based evaluation is rapidly growing in popularity and use among pioneering education practitioners, non-governmental organisations and funding institutions. Among other efforts, the Canadian Parks and Wilderness Society, Sierra Club of Canada and Global Environmental and Outdoor Education Council (GEOCC) jointly proposed an evaluation scheme that flows from a programme-logic model, together with a suggestion of a set of outcome indicators (Thomson and Hoffman, 2003). Table 8-2 presents some examples of such quantitative/qualitative indicators. The Council for Environmental Education (CEE) in the United Kingdom also published a guide for evaluating the effectiveness in education for sustainable development (CEE, 2004).

Table 8-2: Measuring the shifts in values

Measurement Instrument	Pre/Post Test *	Outcome Indicator **
Questionnaires (Likert Scale or multiple choice)	✓	Quantitative shift in individuals/group for questions pertaining to values.
Interview		Student responses reveal a higher appreciation of natural values.
Focus Group		Unprompted, at least 15 per cent of students will comment that their values are more supportive of the environment.
Review of Peers		Students comment on changes in the values of their peers through formal and informal interviews and assignments at both the individual and team level.
Journals	✓	Students make written reference to changes they feel have occurred in their own beliefs, attitudes, or values.
Student art work	✓	Students' drawings of their schoolyard give more emphasis (using colour and perspective) to natural objects.
Feedback form		Unsolicited, students comment on how the programme influenced/changed how they feel about an aspect of nature.

* Pre/Post. Often, an objective measurement of a change in values requires a baseline, pre-and post-programme measurement. A check mark is used to indicate if this is necessary.

** Outcome Indicators. These are quantitative or qualitative statements that result in the desired results we get after using the relevant measurement instrument.

Source: Thomson and Hoffman (2003)

Integrated approach involving all forms of education

Sustainable development is a complex undertaking with connections to every part of life. Capacities required for sustainable development are enormous and can only be enhanced by engaging all possible measures of education, training and awareness-raising opportunities. In fact, education for sustainable development should take place within a perspective of lifelong learning, encompassing all modes of education initiatives; formal, non-formal and informal, from early childhood to adulthood. Available educa-

tional opportunities should not be equated with schooling or formal education alone, nor can they be conceived to limit non-formal environmental education (EE) activities provided by NGOs or advocacy groups. A lifelong learning perspective sees all the different modes of education as a continuous and interactive process, to collectively promote the societal changes towards sustainable development. Roles by different modes of education can be outlined as follows:

Formal education - With the perspective of "education for all," it carries a particular importance in providing basic education to the majority of the population, which is key to a nation's fundamental development, particularly through the improvement of literacy and numeracy. Common curricula like mathematics, science, health and physical education and social studies serve to develop a nation's intellectual infrastructure which is basic to promoting economic and social development. Higher education also responds to societal needs for trained professionals as well as to the leadership required for the construction of modern institutions in various sectors and for improving the standard of living. Subjects of law, economics, science, engineering, agriculture and medical science all contribute to supporting the process of sustainable development.

Non-formal education – In the past, non-formal education demonstrated an impressive development in its scope and magnitude of delivery, in particular, in the field of environmental education (EE). It was developed in response to local needs and priorities, and thus closely linked to the development of the required human capacities within the local context. Non-formal education has advantages, e.g., its curricula are flexible and can be designed relatively quickly, participatory and interactive approaches are inherently adopted in its education methodologies, and it readily reaches a broader audience, i.e., the general public, beyond that of the formal education system. NGOs and community-based organisations have been widely recognised as the primary providers of non-formal environmental education and are gaining greater responsibilities and influence in the development of education of this particular mode.

Informal education - This mode of learning takes place in the family, community, workplace and social interaction, as well as through the media (e.g., newspapers, television and radio) and a diversity of indigenous methods and processes, such as religions, informal beliefs, cultural activities, popular art, theatre and music. Informal learning generally raises public awareness on socio-economic and environmental implications of human activities, and shares relevant information for important decision-making. In particular, vocational training addresses a range of business operations, including technical and managerial aspects, and thus enhances the participant's skills in directing those operations more compatible with sustainable development, while a number of religions in Asia and the Pacific, such as in Buddhism and Hinduism, promote respect and cultural belief related to nature conservation and sustainability issues.

A range of efforts and initiatives were taken for decades to strengthen the roles of different modes of education and to enhance the effectiveness and efficiency of their delivery in response to their respective weaknesses and problems identified from the past experiences. However, these efforts are mostly promulgated on an ad hoc basis and lack appropriate linkage across the sectors as well as inter-agency coordination in a consistent framework.

Synergy among different modes of educational efforts must be created, and an integrated approach needs to be employed. Formal, non-formal and informal education should be recognised as indispensable components of education for sustainable development, a strategic framework to ensure that they work in tandem to collectively cover all skills and expertise, values, and behavioural changes indispensable for sustainability.

Pioneering initiatives are being observed in many parts of the region. Linking literacy education to health, environmental awareness and other sustainable development concerns is progressively undertaken, *inter alia,* by community education groups in India (*Uttarakhand Seva Nidhi*, 2004). Initiatives for strengthening the collaboration between formal and non-formal sectors are under way in Indonesia where the formal education sector created "Local Study" as a subject in the school programme, and NGOs and universities work together to develop and disseminate environmental education materials for use in the subject course across the nation (Hans Seidel Foundation, 2005). In Japan, the 1998 revision of the "Course of Study," or the basic national guidelines for school education set by the Ministry of Education, Culture, Sports and Technology, stipulated the introduction of a new course subject, "Period of the Integrated Studies" (*Sogo Gakushu no Jikan*) in the school curriculum, which provided a window for bringing NGO programmes and community-based, non-formal environmental education into an integral part of school education (Box 8-1). Innovative materials, textbooks and tools, such as Kids-ISO, developed by non-formal sectors including NGOs, business and academia are progressively used in this course. Effective coordination and specialisation according to differentiated roles and effectiveness of education modes attracts special attention (Box 8-8). This viewpoint is particularly important if education for sustainable development is to be promoted effectively within the limited available resources.

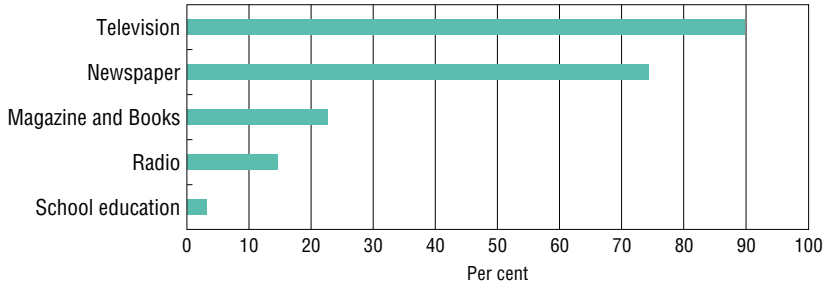
Box 8-8: Differentiated roles and effectiveness of different modes of education

In designing the most effective combination of education measures for achieving the desired goals and objectives, one can always consider the comparative advantages and disadvantages of different measures in a specific socio-cultural background.

A survey in Japan indicated that the people's awareness on environmental issues is more effectively promoted through the media rather than through school education (Fig. 8-5). The contribution of non-formal education as a source of environmental information was not even considered in this survey.

The results suggested that the media is the most effective channel for disseminating basic environmental information, and the allocation of further resources for strengthening the role of the media should be rationally promoted. This would be true in countries where the development of an aware, conscious and independent media sector is sufficiently achieved, although such development is still a challenge in a number of the Asia-Pacific countries. On the other hand, education (formal and non-formal) can better play its role by concentrating on the promotion of higher levels of knowledge, skills or action, rather than the transfer of textbook type of basic information, provided that the basic information is primarily disseminated through the media.

Fig. 8-5: Sources from which people receive information on global environment issues and environmental conservation – A Japanese survey



Source: Cabinet Office, Government of Japan (2001)

Developing institutions for promoting education for sustainable development

It is again emphasised that education is considered as one of the primary tools to achieve sustainable development and education initiatives and programmes need to be more closely linked to national goals and priorities. In this perspective, national education systems and policies can no longer be discussed in the small circle of sectoral stakeholders, such as education ministries, schools, teachers, academics and some NGOs. Rather, the discussion should involve an entire spectrum of stakeholders, including financial, development, environmental ministries, local governments, community groups and scientists in different disciplines, as well as a whole range of NGOs active on socio-cultural, economic and environmental aspects of sustainable development. In addition, it should be noted that communities, NGOs, business and other civil society groups are increasingly gaining competence in providing education programmes, in particular, non-formal education on environmental and development concerns, and therefore, the engagement of these stakeholders in formulating, implementing, and monitoring education policies and programmes is deemed essential in order to ensure a holistic and integrated approach.

A national coordinating mechanism should be established in each country for strengthening the multistakeholder dialogue, facilitating the participatory formulation of the national policy framework and action plans, ensuring harmonisation and partnership in their implementation, and enhancing the public support and commitments for the promotion of education for sustainable development This mechanism provides an opportunity to identify and acknowledge the roles of all relevant stakeholders, and engage them as partners in establishing a national system for developing and delivering the services of education for sustainable development. Among other steps of multistakeholder dialogue, a collective exercise for sharing a vision for sustainable development define their respective roles in contributing to achieving the common goals and the formulation of policies, programmes and actions is considered particularly important and useful for enhancing the ownership and responsibility of all relevant stakeholders in the promotion of education for sustainable development.

Efforts to establish such national coordination mechanisms are being initiated in a number of countries in the region. The Japan Council on the UN Decade of Education for Sustainable Development (ESD-J) was founded in June, 2003, as a non-governmental networking organisation dedicated to promoting education for a sustainable society in Japan. Being primarily a gathering of NGO/NPOs, but also of individuals including teachers and other education practitioners, researchers, academics, businessmen and even government officials, who are actively involved in broad-based social issues such as the environment, development, human rights, peace and gender, ESD-J provides a thorough platform for sharing views and forging new collaborations for further promotion of education for sustainable development in Japan. ESD-J also coordinates interfaces with the government, local authorities, companies and educational institutions (ESD-J, 2005). The New Zealand National Commission for UNESCO has taken a leading role in assembling a New Zealand Coordinating Committee for UNDESD, to plan and implement the national response to the Decade. The Committee is comprised of representatives from government, business and civil society who are committed to education for sustainable development. Initiation of this type of coordinating mechanism at the national level is highly encouraged in the course of the implementation of UNDESD (UNESCO, 2005c).

The national coordination mechanism will provide a platform for developing a national policy framework that provides basic guidance for all stakeholders to join forces to promote their respective activities in an integrated manner towards the attainment of the common goal of sustainable development. In this respect, the framework, essentially supporting the notion of education for sustainable development and addressing the holistic and integrated approach to be applied, should explicitly include definitions of the respective roles of different groups, their commitments and an action agenda to ensure the engagement of all stake-

holders in relevant initiatives and programmes at the national scale. Ultimately, the national education policy should be revised in its entirety so that the provision of education for sustainable development becomes central to the interests of the entire education sector and sets basic principles for the further development of the national education system.

There is no doubt that governments and groups at all levels have a significant role to play in contributing to the successful promotion of education for sustainable development. However, the governments' role as providers of education should be viewed with caution. This is because education for sustainable development is on many occasions discussed as a bottom-up exercise in a process of decentralisation, and above all, historical reviews demonstrate that the governments' intervention, especially on the contents of educational programmes, does not provide impartiality for the successful implementation of education in any field of study. An ADB research report on education and national development underscored skepticism on the effectiveness of governments' top-down control and intervention on school organisation and curricula. The report, "coupled with reviews of practice, provided sufficient insights for planning effective schooling if the planning and implementation processes include opportunities to modify inputs and processes as evidence of effectiveness is acquired" (ADB, 2001). In this context, the government functions for the promotion of education for sustainable development are defined as "enablers" or "facilitators." A UNESCO working paper (UNESCO, 2005c) provided the following list of major functions of governments:

- Policy-making and framework setting;
- Promotion of public consultation and input;
- National and international public campaigns;
- Restructuring of educational systems; and,
- Initiation of demonstration/pilot projects involving relevant stakeholders.

Box 8-9 presents further ideas on prospective policy measures in the "enablers" context that can be applied by governments at different levels, in addition to enhancing the overall access to and quality of the country's education system, in general, and directly providing exemplar education programmes on a demonstration basis. The list has been developed mostly on the basis of the experiences in the delivery of environmental education programmes during the past decade. In order that the government can better discharge these "enabler" functions, the institutional and human capacity development in the governmental sector is essential. Also fundamental is the development of a national policy framework through multistakeholder partnerships and participation before adopting and operationalising any policy measures.

Box 8-9: Selective list of governmental policy options in the "Enabler" context

De-regulation on the curriculum setting and contents
De-regulation on the curriculum setting and contents is urged to allow educators at different levels to employ maximum flexibility in incorporating sustainable development concerns in socio-cultural, economic and environmental aspects in locally-specific contexts.

Develop provisions to facilitate the inter-sectoral collaboration
In order to provide a rationale, a (de) regulatory basis and necessary support that will encourage optimal interaction among formal, non-formal and informal education sectors in planning and implementing education programmes, (e.g., application of education materials developed by NGOs, lectures by non-teacher personnel, linking classroom and sites for practical experiences,) is necessary. Specific examples include the creation of "Sogo Gakushu no Jikan (Box 8-1).

Enhancing public access to educational resources
Measures for enhancing public access to educational resources include, accumulation and dissemination of relevant information, such as existing educational facilities, courses, competent tutors, course materials, educational grants and scholarships. Development of a local inventory of educational resources, often undertaken by local governments, is well-known as an effective option.

Support networking
Networking among different education initiatives effectively facilitates the exchange of information and experiences for improving their programmes and promoting further inter-sectoral collaboration. Museums and other social education facilities specialised in different sustainable development subjects, in addition to schools, universities and natural science facilities, such as zoos and botanic gardens, may join the network. Governments could provide incentives and support for forming such platforms in a number of ways. The channelling of national/local undertaking with international resources may also by facilitated by governments.

Establishment of local centres
Local centres for education for sustainable development may have multiple functions. They may be established, or designated from among existing facilities, such as eco-museums, as a "more visible" gateway for the public to education for sustainable development, providing hubs for local networking, constantly-accessible information base and permanent forums to facilitate dialogue and information exchange among relevant stakeholders.

Support to enhancing educational capacity
Providing or enhancing opportunities for training in terms of up-to-date and scientifically accurate sustainable development is an important area of government intervention. Teacher re-training may also be conducted in collaboration with appropriate education institutions, such as universities.

Promoting public access to information and assessment tools
Data and information, especially on socio-economic and environmental trends, their interrelated natures, encountered problems, available alternatives and their respective impacts are always critical components of learning sustainable development. It is crucial to enhance the availability of, and to facilitate access to such relevant information which is often retained by the government sector. Promoting diffusion of analytical and managerial instruments, such as "*environmental management systems*"[36] and "*ecological footprints*,"[37] is also effective in promoting capacity development in the pertinent aspects.

Financing education for sustainable development – Redirection of existing financial resources addressed for educational purposes would be undertaken in the first place, while mobilising fresh and additional resources would also deserve significant attention given the importance of education in achieving the ultimate goal of sustainable development.

Pursuing an effective policy mix

It has been repeatedly emphasised that human capacity development is an essential factor for achieving sustainable development. However, it should be recognised that education alone cannot be a panacea for all the problems of sustainable development. As Box 8-10 illustrates, one such failure in relation to natural resource management is that capacity enhancement by awareness-raising has not provided a solution to immediate problems on countless occasions.

Box 8-10: Education, training and public awareness addressing the "tragedy of the commons"

Management of fisheries is often described as the ultimate example of the common dilemma – "tragedy of the commons." The resource is fleeting, and the fish one does not catch today may be caught by someone else tomorrow. It is difficult to see the fisher's incentive to conserve rather than catch as much as possible as quickly as possible. Since each fisher operates with the same rationality, the users of the fishery are caught in the inevitable process that leads to the destruction of the very resource on which they all depend. Because each user ignores the costs imposed on others, individually, rational decisions accumulate and result in a socially irrational outcome. Fishers are seen as trapped in a situation they cannot change, where education or awareness-raising on resource scarcity hardly has any effect as they are already taking rational decisions. The "tragedy" analysis was applied in shaping fisheries policy in Atlantic Canada in particular, and played a central role in the government's decision to intervene and privatise.

However, findings from a large number of cases covering a range of resource types, geographical areas, and cultures have revealed the existence of local and traditional management systems and common institutions. A number of fishing societies and other community-based management bodies elsewhere, in particular, in East Asia and the tropical Pacific, have demonstrated their capacity to make rules to manage resources on which their livelihoods depend. Such rules include: territorial controls, access limits, seasonal limits, technology restrictions, breeding stock protection, protection of juveniles and size limits. The challenge lies with establishing appropriate institutional arrangements that minimise transaction costs and counteract opportunistic behaviour such as free-riding. To facilitate this process, the fishery manager needs experience of collective action in fishery management and the building of institutions. Capacity-building, in particular through training, can play a vital role in this context.

With the "awareness" and "knowledge of experience" of user groups as the basis, fishery resource management can eventually be made more effective by engaging governmental interventions in the "co-management" framework. Measures of such intervention include: the provision of a legal basis for the local rules and for apprehending rule violators; policing to enforce laws and rules; devising economic instruments to mitigate impacts of fishing restrictions; promotion to develop local enterprises designed to diversify livelihood sources of fishing communities; mediating conflicts between local and outside resource users; and, providing a political environment that allows for the pursuit of community-based initiatives.

Source: Adapted and summarised from Berkes, Moahon, McConney, Pollnac and Pornery (2001)

In order to ensure that capacities developed through education, training and public awareness campaigns have concrete impacts on the tangible improvement in social, economic and environmental sustainability, combination and synergy with other policy measures is essential. It is emphasised that policies for the promotion of education for sustainable development should work most effectively if the education policies are

appropriately integrated in the overall national policy framework for sustainable development and optimally teamed with other provisions of regulatory, market-based and voluntary instruments, including their enforcement/implementation stipulations.

It should be noted that the effects of education measures and other policy instruments are always mutually reinforcing. While impacts of education programmes can be multiplied with optimal combination with other policy measures, education contributes to smooth adoption, as well as to effective enforcement of and compliance to any policy measures by increasing public support through awareness-raising and sensitisation of the general public.

Conclusions and recommendations

Human resource development is the key to successfully achieving sustainable development, and a range of educational measures, including formal, non-formal and informal education and learning in broad terms is the primary tool to develop the human capacity required for sustainable development. Pertinent practices, including in particular, those in environmental education, are widespread in various forms and efforts are ever expanding and their contribution to sustainable development is demonstrated in a number of cases, mainly at individual, group, community and local levels. However, despite their potential and expectations, the impacts of educational measures on society-wide changes have yet to be demonstrated with substantiated evidence. Considering the critical importance and urgency of realising the changes for shaping the sustainable future in the region, serious efforts are needed to reorient education policies and programmes and enhance their relevance and effectiveness in contributing to the attainment of sustainable development.

In response to this challenge, four important response principles are emerging globally:

1) Environmental education should readjust its focus from ecological concerns to interlinking relationships among socio-cultural welfare, economic livelihood and environmental quality in a broader agenda of sustainable development. This evolution will help educational initiatives to better address practical solutions to actual environmental problems in the existing socio-cultural and economic conditions and to enhance its relevance to the promotion of sustainable development at the society scale.
2) An integrated approach should be employed to enhance interlinkage and collaboration among educational programmes in different sectors, ranging formal/non-formal education, training and public awareness-raising. The optimum combination of different educational opportunities may be pursued within a perspective of lifelong learning.
3) Appropriate institutional arrangements should be introduced to best support the notion of education for sustainable development. A policy framework strongly addressing a holistic and integrated approach to education for sustainable development and a coordination mechanism involving not only governmental agencies but also all relevant stakeholders should be established at the national level. Governments can play an "enabling role" by introducing a range of innovative policies to facilitate and support the education initiatives and programmes by all stakeholders committed for sustainable development.
4) An effective policy-mix should be employed among educational measures and other policy instruments in the non-education field. Such policy instruments would include regulatory, voluntary and market-based measures. Sustainable development cannot be achieved by education alone.

In line with these recommended principles, immediate actions that countries in the region can take are recommended as follows:

A national multistakeholder process to deal with education for sustainable development should be initiated as a first step to establish a coordinating mechanism for education for sustainable development. The process essentially involves: a) definition and recognition of a broad range of relevant stakeholders for education for sustainable development, including, in particular, representatives of government agencies, schools, universities, education institutions, NGOs, business, religious groups and community-based organisations, b) improvement of communication among those groups, and c) establishment of a national forum or council for multistakeholder consultation. A media campaign for general sensitisation on education for sustainable development would also be conducted to facilitate the process.

Once such an organisational foundation has been put established, the development of a national master plan for education for sustainable development should be undertaken, with the participation of all stakeholders as a prerequisite. This master plan will provide an overall policy framework and action strategy for all stakeholders in the country to join forces to promote their respective activities in an integrated manner towards the attainment of the common goal of sustainable development. It should include definitions of the respective roles of different groups, their commitments and an action agenda to ensure engaging all stakeholders in relevant initiatives and programmes. Proposals on enabling policy measures for promoting such initiatives and programmes may also be addressed in the master plan.

In order for governments to appropriately discharge the enabling functions, i.e., formulate and implement a range of enabling policies, and provide appropriate support and necessary resources in facilitating the national multistakeholder process, an institutional arrangement to ensure a "whole-government" approach should be provided. Such an arrangement should include: a) the securement of a strong political commitment with top-level leadership, and b) the establishment of a mechanism for inter-ministry coordination on ESD policies and programmes. A core group, such as an inter-ministry task force, should be designated with appropriate authority and responsibility. An important mandate of the core group will be capacity-building for government officials (in all sectors), and reviewing/reorienting existing policy instruments across all ministries concerned, including stocktaking from other international initiatives addressing education issues (Education for All, UN Literacy Decade, etc.). Particular attention should be paid to government functions in terms of channeling of national/local undertaking with international initiatives, such as regional networking, and with external financial resources.

The United Nations Decade for Education for Sustainable Development, 2005-2014, is very timely as it provides an indispensable opportunity to boost the concerted efforts at national, regional and global levels and mobilise the necessary resources to comprehensively respond to the major challenges of education, public awareness and training in achieving sustainable development that were addressed in the past decade. Nevertheless, the challenges are enormous as education for sustainable development has to meet the broad expectation that it should play an principal role in achieving the Millennium Development Goals, the target year of which has been set in 2015, just after the completion of the decade.