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**Environment Outlook for Asia Pacific**

**Environment Outlook and Pathways for Asia Pacific**

**Discussion Document -- Not for quotation or citation.** The purpose of this document is to facilitate discussions during the First Forum of Ministers and Environment Authorities of Asia Pacific, 19-20 May 2015, Bangkok. Comments are welcome and should be sent to [uneproap@un.org](mailto:uneproap@un.org). The document will be revised to reflect all verbal and written comments received no later than 31 May 2015.

## I. Introduction

1. Asia Pacific is home to over 4.2 billion people, over 50 per cent of the world's urban population and sixteen out of 28 mega cities (UNDESA, 2014). Many Asian economies achieved rapid economic development during the last few decades (IMF, 2014), accompanied by rapid population growth and urbanization. Millions of people have been lifted out of poverty and have improved their quality of life (ESCAP, ADB, & UNDP, 2015; ESCAP, 2014), with some 700 million people becoming middle-high income consumers. At the same time, millions remain impoverished with inequality on the rise.

2. Rapid economic development and the corresponding consumption of primary resources and energy have also resulted in widespread environmental degradation and severe stress on the region's air, land, water, and forests. The future potential of Asia Pacific is being undermined by widespread environmental degradation and high levels of resource consumption. In 2010, the region overtook the rest of the world in consumption of primary resources. High levels of air, water and soil pollution incur large social and health costs, and may even negatively affect industrial production and economic activity, thereby undermining the prospects of prosperity and well-being.

3. There is an increasing realisation that a healthy environment is a prerequisite for socio-economic development and human well-being. Poverty and inequality can only be addressed if environment is part of the solution. Looking at progress from Agenda 21, adopted in 1992 in Rio, to Rio+20 in 2012, countries recognized that while there had been progress, it was uneven and insufficient and worsened by multiple crises. They agreed to raise their level of commitment and resolved to take urgent action to achieve sustainable development. In order to encourage more concrete actions, countries agreed to establish Sustainable Development Goals (SDGs). The SDGs provide a once in a generation opportunity to achieve sustainable development that fully addresses environmental and social needs in Asia Pacific.

4. The overall message is that the environmental consequences of traditional models of development are undermining development itself. The second section of this paper summarises critical environmental trends. The third section suggests possible options for pursuing sustainable development.

## II. Critical Trends

5. Rapid economic growth in Asia Pacific has come at a significant cost to the environment; it has reached the point where it is starting to jeopardise the advances made and the stability of socio-economic development in many countries of the region (UNEP, 2005; Zhang et. al., 2012). Moreover, overall consumption and resource use is expected to continue its rapid expansion as the new middle class exercises its purchasing power, more people are lifted out of poverty, and population continues to rise. With the current development model, it will not be possible to realize the national strategic objectives that countries have set themselves, end poverty, and achieve prosperity and well-being for all. This section summarises key trends that together make a case for concerted action to curb environmental degradation and change the development trajectory.

## **A. Rising Costs from Climate Change and Vulnerability**

6. Climate change is driven by global greenhouse gas emissions, but its impacts are felt strongly in Asia Pacific. Asia is still predominantly an agrarian society and more than 80 per cent of its rural population is dependent on agriculture for their livelihoods. Climate change would reduce rice yield, a staple food in Asia Pacific, over a large portion of the continent and would increase the frequency of food production shortfall events (when harvests fall 50 per cent or more below the production in an average year), possibly from around two years per decade under normal climate to 5–6 years per decade in the 2070s.

7. Increased vulnerability to climate change and disasters is already imposing economic costs, with poorest countries suffering the most. Flooding in Bangladesh for instance costs about USD 1 billion a year, which is equivalent to 6 to 7 per cent of the annual government budget (UNEP, 2014). Other countries have suffered from similar unanticipated events. The economic losses caused by disasters in Asia Pacific amounted to almost USD 60 billion in 2014 alone, with the great majority due to storms and floods (ESCAP, 2015). Future investments in resilient infrastructure will be needed to defend against these vulnerabilities. A recent report estimated that four nations – China, Japan, South Korea and Mongolia – together can expect to pay USD 23 billion annually in the years to 2050 to “climate-proof” their infrastructure to cope with changing weather patterns (ADB, 2013). Due to uncertainty of reliable freshwater supply under climate change, maintaining water services at non-climatic change level would require more than USD 500 billion up to the year 2030, of which more than 85 per cent would be required for Asia and Africa (IPCC, 2014). Further investment in climate change mitigation efforts could reduce the future costs of resilience, climate adaptation, and disaster response. Without stronger climate mitigation efforts, these costs are likely to increase and jeopardise further development in the region.

## **B. Food, Water and Energy Insecurity**

8. A global water crisis has been identified as one of the top ten global risks in 2014 by the World Economic Forum, reflecting not only the increasing incidence of droughts and floods but also the overuse of groundwater resources and worsening pollution. Increasing risk of shortages of water for drinking and agriculture will be intensified by rising population and urbanization, and could become the focus of future conflict. Pollution from economic activities threatens drinking water quality, especially in areas where poor people live. Water is also necessary for most energy production, including coal-fired electric power generation, coal mining, and hydro-fracking. About 15 per cent of the world’s water is used to generate energy, and about 70 per cent for agriculture. Likewise, a significant amount of energy is needed for water supply and treatment as well as for agriculture (IEA, 2012). Many countries in the region, especially China and India, are water stressed and likely to become more so in the future. The energy sector, due to regional and global increases in demand for energy will increasingly compete for water with the agricultural and household sectors. Water shortages have already impacted power generation in China and India (IEA, 2012).

9. Pollution, changes in land-use, unsustainable agricultural practices and food systems, have had negative impacts on food security. Especially in Asia and the Pacific, the negative impacts of black carbon and ozone pollution has detrimental consequences for food productivity (UNEP & WMO, 2011). With regards to aquaculture, international markets exert huge pressure on fisheries, resulting in the reduction of fish stocks that

ensure local food security, particularly in developing countries (Villasante et al., 2012). Indonesia has reported losses of its native mangrove habitat to shrimp aquaculture, logging, coastal development, and chemical pollution (Lenzen et al., 2012). Over exploitation of fish stocks shows rapidly increasing trends; resulting in rapid decreases in stocks. Research suggests that climate change has the potential to severely impact marine ecosystem, particularly in the tropical regions, with up to 50 per cent decrease in 10-year averaged maximum catch potential by 2055 (Cheung et al., 2010).

10. Eighty-seven per cent of all people involved globally in fisheries and aquaculture live in Asia. Accounting for nearly 90 per cent of global production, Asia Pacific dominates world aquaculture and food markets. Marine and coastal pollution is an increasingly problematic trend in the region. Beyond the worsening pollution, competing water demands, and extreme climatic events jeopardise the security of water systems, regionally and globally. These linkages between food, energy, and water are often called a “nexus,” and competition regarding the use of these resources is expected to greatly intensify in the future.

### **C. Deteriorating Health and Rising Costs from Air and Other Pollution**

11. Air pollution is a major threat to human health and wellbeing of people, especially in Asia Pacific. Outdoor air pollution is estimated to cause over 2.5 million premature deaths in the region. In addition, indoor air pollution caused around 4.3 million premature deaths globally in 2012, of which the South-east Asian and Western Pacific sub-regions bear the brunt of the burden with 1.69 and 1.62 million deaths, respectively (WHO, 2014b). WHO calculations put the environmental contribution to the burden of disease in Asia and the Pacific (which includes countries and areas of the Southeast Asia and Western Pacific regions) to be 24 per cent of the total burden of disease.

12. Increasing air pollution is mainly caused by fossil fuel combustion and the increase of private transport motor vehicles; as well as inefficient use of energy in the building sector, including the use of biomass for cooking and heating (WHO, 2014a).

### **D. Unsustainable Consumption**

13. Over the last four decades, the Asia Pacific’s share of world domestic material consumption has grown from just under 24 per cent in 1970 to over 53 per cent by 2010, accounting for 67 per cent of global total growth. Domestic material consumption has increased at an annual rate of 4.8 per cent over the four decades from 1970 to 2010 and the region is now the single largest user of natural resources globally. The corresponding growth rate for the rest of the world was around 1.6 per cent (UNEP, 2015a). The rapid economic growth in this region has clearly come at a cost. Resource use and corresponding emissions have grown at a faster speed than anywhere else, and many countries have reached the limits of domestically available resources, leading to increasing net imports.

14. By 2015, the number of Asian middle class consumers will match those in Europe and North America and by 2021, there could be over 2 billion people in middle class households in Asia and the Pacific (Kharas, 2010). This demonstrates that persistent efforts towards poverty eradication are paying off, with growth of average household final expenditure per capita in the region allowing people to afford more goods and services. However, the material requirements to support this growth are already having significant implications for the consumption of energy and natural resources.

15. At the regional level, consumption is not only increasing but also changing to more intensive modes. Rapid urbanisation and the rise of megacities and the growing middle-class are all interlinked trends in the region that are causing a shift in peoples' diets away from staple cereals toward meat, dairy products, fruits, and vegetables. In 2010, China's soy imports accounted for more than 50 per cent of the total global soy market. The annual global consumption of beef between 2000 and 2030 is expected to increase by 25.4 million tons, of which almost half (12.2 million tons) will be from this region (FAO, 2011).

### **E. Security Implications of Natural Resource Scarcity**

16. The increasing impacts of climate change coupled with countries' rapid economic growth are already signaling the potential to jeopardise security in the region. Growing and urbanizing populations are demanding ever more resources, increasing pressure on governments to deliver adequate supplies of food, water and energy; as well as services and jobs. For example, where governments cannot provide adequate opportunities for human development, migration may follow, as increased transboundary mobility enables people find ways to escape poverty and seek opportunities elsewhere, a potential cause for tension among countries. The competition for increasingly limited natural resources motivates competing claims by countries and groups trying to secure access to resources such as fisheries, hydrocarbons and seabed mineral resources. Fishing zone, resource-rich island disputes and other potential conflicts involving countries that share ecosystems and estuaries present growing examples of the ongoing disputes in the region that demonstrate the intractable link between sustainable resource management and peaceful development.

## **III. Solutions Landscape: Options for Action**

17. Despite the serious environmental challenges, Asia Pacific countries also have opportunities to move towards inclusive green economies. Many countries are still at early stages of the development process, expecting huge investments in new infrastructure over the next two to three decades. This offers important opportunities to consider how infrastructure-related services can be provided in more sustainable ways. It is urgent for countries to avoid being locked into costly, high-polluting, resource-intensive and high-carbon pathways. Leapfrogging to smarter solutions that already exist in wealthy countries is not only possible but necessary for resilient development and lasting prosperity.

18. A number of countries have already developed innovative strategies that show the emergence of an understanding of the risks to long-term development associated with a deteriorating environment. Japan's national development strategy is based on the Sound Material Cycle Society, and interpreted in practice through the 3Rs: reduce, reuse, and recycle. In China, the leaders have expressed their intention to build an Ecological Civilisation, one which is "frugal in their use of energy and resources and protects the environment." Thailand for its part has developed the Sufficiency Economy approach to guide its development, with a vision to build "a happy society with equity, fairness and resilience". The Kingdom of Bhutan has declared that the purpose of development is to create the enabling conditions for happiness of individuals and society. Gross National Happiness (GNH) as a development approach seeks to "achieve a harmonious balance between material well-being and the spiritual, emotional and cultural needs of an individual and society" (UNEP, 2012a).

19. This section identifies a set of policy options which, approached as elements of a framework for sustainability, could usher in a real transition to sustainable development in Asia Pacific. All these areas for action offer multiple benefits for both environment and development, and they have the potential to yield high societal returns on investment.

## **A. Enhance Resilience**

20. Asia Pacific is highly vulnerable to adverse impacts of climate change and associated risks as well as prone to natural disasters. Many areas in the region are highly vulnerable to sea-level rise and extreme weather events: all Small Island Developing States, including the Pacific Island countries; countries with low-lying coastal areas (for example, Bangladesh, Indonesia, Viet Nam); large cities located in coastal regions (for example, Ho Chi Minh, Manila, Bombay, Bangkok, Jakarta, Karachi, Shanghai, Tokyo); and mega deltas in regions with large floodplains (for example, Mekong Delta, Ganges-Brahmaputra-Meghana). Between 1970 and 2010, 1.7 million lives were lost in the region due to natural hazards – more than half of these casualties were caused by storms and floods (ADB, 2013). The economic losses caused by disasters in Asia Pacific amounted to almost USD 60 billion in 2014 alone (ESCAP, 2015). Increasing frequency and severity of disasters – the likely consequence of worsening climate change – could offset many development gains by harming livelihoods, inflating food and energy prices, damaging and destroying infrastructure and disrupting the supply of necessary goods and services, which could trigger large displacement of human settlement. To safeguard the development progress achieved until now, the region needs to give higher priority to climate change and disaster prevention and preparedness.

21. Protecting communities from adverse effects of climate change requires several measures to ensure the safety of populations, security of livelihood assets, including ecosystems and their services. It also requires building resilience of key economic sectors and infrastructure, such as flood protection, irrigation and drainage, erosion protection and beach nourishment, as well as promotion of alternative livelihoods and market development for new products. For example, to reduce the impacts of climate change and disasters, cities located in vulnerable areas need to upgrade their infrastructure and ensure that new construction is more resilient. Slum areas tend to be particularly vulnerable so improved homes and effective drainage canals in such areas are of high importance. Rural areas, where half of the region's population – and many of its poor – live, are also vulnerable and in need of investments to enhance resilience. Rural resilience could be improved by measures such as broadening income bases for farming households and introducing crop varieties that are stronger to extreme events.

22. Ecosystem protection and revitalization is a related high priority area for action. Implementation of Ecosystem based Adaptation (EbA) measures, particularly for coastal ecosystems, would help build the resilience of coastal communities. National Adaptation Programme of Actions (NAPAs) developed by Least Developed Countries have recognized the value of ecosystem services, and more than 20 per cent of their national proposals have included the use of ecosystem services in support of other adaptation activities, including infrastructure, soil conservation, and water regulation.

23. The impact of disasters can be reduced if multi-hazard early-warning systems are in place and if there is capacity to carry out temporary mass-evacuations. Establishing, or strengthening, such systems and developing evacuation plans are areas that require more attention. Even with good preparation, disasters do happen and there is a need for



both immediate emergency relief and longer-term recovery and rebuilding. There are elements of a regional support system already in place to support such efforts, but with the expected increase in natural disasters, there is a need to reinforce these regional frameworks.

24. Building resilience to climate change and extreme weather events in the region and vulnerable communities needs to be seen within the frame of countries' overall development paths. Development can yield positive ancillary adaptation effects or co-benefits, provided it takes into account climate change in its initial design. Adaptation actions can have significant co-benefits such as alleviating poverty or enhancing development. Many aspects of economic development also facilitate adaptation to a changing climate, such as better education and health. Likewise, there are adaptation strategies that can yield welfare benefits even in the event of a constant climate, such as more efficient use of water and more robust crop varieties. Maximizing these synergies requires a close integration of adaptation actions with existing policies and planning. This is referred to as "mainstreaming" climate change into development.

## **B. Decarbonize economies**

25. Asia Pacific is currently on a carbon-intensive development pathway. Many countries still have low per-capita emissions, but the middle income countries have already reached emission levels that are incompatible with global climate goals. Stabilising per-capita emissions of greenhouse gases at significantly lower levels than currently seen in the OECD countries would bring multiple potential benefits, including energy security, air quality (due to limited use of fossil fuels), and green jobs (due to the labour needed for constructing climate-smart building and infrastructure, and to install renewable energy). Such transformations are fully possible but require determined government intervention, mainly in two areas: efficient use of energy and a shift to renewable energy sources.

26. Energy demand management is the most important area for decarbonisation. There is a large potential for energy efficiency, in many cases at low or even negative cost. Economic incentives and regulations need to work hand-in-hand to make this happen. Phasing out energy subsidies is one of the most effective ways to strengthen the incentives for energy efficiency investments and to steer consumption towards low-energy options. Such reforms may require complementary measures to protect low-income groups. In most countries, buildings are responsible for a high share of energy consumption. Building codes with ambitious energy efficiency requirements can be crucial to improving the energy performance of this sector. Promoting new business models that encourage energy saving, such as Energy Service Companies (ESCO), can be both environmentally and economically beneficial.

27. Renewable energy is growing rapidly in the region with China showing strong leadership. In 2013, almost one third of global investments in new solar and wind power took place in China (FS-UNEP, 2015). The prices of wind power mills and photovoltaic panels, as well as technologies for storage of electricity, have fallen dramatically over the last few years. Investment costs are now in many cases at levels that make renewable energy sources commercially competitive with conventional ones, such as coal-fired power plants. Even so, government policies play a key role for accelerating the deployment of renewable energy. Investments in energy technologies are long-term and investors need to feel confident that sudden policy changes will not reduce profits. Clear signals from governments concerning the desired direction for the countries' energy systems and stable regulatory regimes that are consistent with those visions can build

such confidence. Experiences from Europe illustrate the importance of institutional arrangements and innovative business models for speeding up the deployment of renewable energy. For example, separating the ownership of power generation facilities from that of the transmission grid and facilitating the establishment of small to medium-scale energy generation co-ops have been highly beneficial in this regard.

28. Building low-carbon societies, powered primarily by renewable energy, also offers opportunities to strengthen resilience. Flowing energy, such as wind and sunlight, are distributed across the landscape and need to be harvested where they exist. This is a fundamental difference from fossil energy carriers which are highly concentrated and easy to transport and therefore perfect for powering large-scale centralised production systems. Renewable energy sources, in contrast, are directly available locally and therefore more suited for powering localised systems of production and consumption. Countries that are still at relatively early stages of development have the opportunity to build up their infrastructure and to shape their systems of production and consumption to fit with the characteristics of renewable energy sources. Building societies around the characteristics of fossil fuels and later converting to renewables may turn out to be a costly mistake.

29. As long as fossil energy is still being used, it is important to ensure that it is used efficiently with small losses. Furthermore, fossil fuels with low carbon intensity, such as natural gas, should be prioritised over more polluting ones, wherever possible.

### **C. Promote Sustainable Consumption and Production**

30. Asia Pacific is rich in natural resources, but this wealth is rapidly decreasing. This region now consumes more resources, including minerals and ores, fossil fuels and biomass, than the rest of the world. This is partly due to the population and to the fact that the region produces large volumes of goods that are exported and consumed in foreign markets. Nevertheless, the current growth model is highly resource intensive and contributes to a range of serious environmental problems, including greenhouse gas emissions, loss of biodiversity and ecosystem functions, and pollution (UNEP, 2011b). In addition, freshwater and topsoil – both of key importance for meeting basic needs as well as for supporting economic prosperity – are under severe pressure.

31. Asia Pacific is also becoming increasingly dependent on imports of natural resources from other regions. This increasing trade can to some extent alleviate the pressure on the region's ecosystems and resource stocks but it also increases exposure to geopolitical risks and dependence on potentially volatile global markets. Supply disruptions and price spikes for commodities can cause problems for the region's private sectors, hardship for low-income groups and social unrest. There are thus ample reasons why countries in the region need to find ways of using their natural wealth more wisely – not only considering short-term economic gains but also the need for resources to support wellbeing and prosperity over the longer term.

32. Curbing the region's demand for materials requires major changes in systems of production and consumption. Such changes – a shift to Sustainable Consumption and Production (SCP) – would ensure environmental objectives such as decoupling of resource use from economic prosperity, and address pollution issues. But a transition to SCP would also help to address many of the social priorities: poverty eradication, sustainable livelihoods, equity, thriving small and medium size enterprises (SMEs), energy security, etc. In fact, SCP is uniquely suited to the needs of this region (Akenji, 2012).



33. There is no single policy intervention that can bring about a shift to SCP; well-designed mixes of policy tools tailored to the resource use patterns in individual sectors and national circumstances are needed. The conventional way of approaching SCP – mainly relying on eco-labels and consumer information – has been found to have limited potential and needs to be supported by complementary interventions. Regulation of products and services also needs to be modified. Governments have traditionally used criteria such as health, public safety, and security to develop such regulations. With new knowledge of the risks of unsustainable production and consumption it is now necessary to use sustainability criteria to set minimum product/production standards, and establish licensing/permit systems for business practices, etc. Action areas include for example: green tax reforms that shift taxes from income to resource consumption and pollution; promotion of lifestyles focused more on wellbeing and education; business models based on leasing and sharing; requirements for long product warranties and reparability; and multi-purpose buildings, which can limit the overall demand for floor-space.

34. A transition to SCP would need to affect culture and social norms. It is therefore essential to engage religious, cultural, academic and political organisations - custodians of our cultures and institutions that shape norms and behaviour. Working with the media to influence the images it conveys of attractive lifestyles and consumption patterns is another important avenue. Such a transition also involves protecting traditional practices, such as community-based forest management, product repair and reuse, and social economies, such as trade by barter. Regulations that allow and facilitate such activities would contribute to wellbeing and livelihoods while also reducing environmental impacts. As micro-SMEs stand for a large share of economic activity and employment in the region, it is important to support them. Licensing for crafts and farmers' markets in attractive city locations, setting up of innovation centres, micro-credit schemes etc., are examples of actions that could provide support across the region.

35. It is worth emphasising that a large segment of the population in Asia Pacific is already living within ecologically sustainable limits. As countries develop there is a need to protect such lifestyles, and to enhance the wellbeing of people and communities within the earth's environmental boundaries.

#### **D. Maintain biodiversity and sustainable provision of ecosystem services**

36. Current development patterns are harming the region's rich natural heritage, as well as its great diversity in ecosystems and habitats (SCBD, 2014). Natural ecosystems perform various functions that are of great value for society. Such functions include, for example, regulating hydrological flows and purifying water, protecting human settlements against natural disasters, bolstering climate change by storing carbon, and providing food. The integrity of natural ecosystems is of particular importance for indigenous groups and many rural communities, where households often depend on services and materials directly from nature for their livelihoods. Protecting ecosystems is therefore of key importance also for poverty alleviation. Many of the services provided by nature are currently taken for granted and their value to society is insufficiently recognised in decisions by businesses and governments. As a result, many ecosystems of vital importance to local communities and of great value for society in general are gradually being degraded or lost. Turning these trends around would have multiple benefits.

37. Land use changes, mainly agricultural expansion (including oil palm plantations) and infrastructure development, nitrogen deposition, climate change, and invasive

species are among the key drivers of biodiversity loss in Asia Pacific (Braimoh et al., 2010). Given the significance of land conversion for biodiversity loss, strategies for land use can play an important role. To implement such strategies, both regulation and economic incentives are needed.

38. Protected areas, such as national parks, exist in most countries in the region. They can be effective for protecting species and ecosystem functions but to be fully effective they need to be connected into larger networks with corridors that allow migration, such as in the Chitwan national park in Nepal. Effective protection against logging, poaching and other destructive practices is also necessary. When establishing new protected areas, or expanding existing ones, agreements with local communities may need to be worked out to allow for traditional uses that cause little harm.

39. There are good experiences of allowing local communities to look after and manage natural areas, for example in India, Viet Nam and the Philippines. Since the lifestyle of these communities depends directly on ecosystem functions they have incentives to ensure that such functions are sustainably maintained. It is also possible to strengthen such incentives, for example by paying communities for the ecosystem services provided by the land they are managing – Payment for Ecosystem Services (PES). Promotion of eco-tourism can also provide incomes for communities and strengthen incentives for sustainable management. Community-based management typically requires that the government provides support to the communities involved, strengthening their capacity for sustainable use and management. Looking beyond protected areas, it is important to promote multiple land use that allows certain economic activities while also protecting vital ecosystem functions.

## **E. Control and prevent pollution of air, water and soil**

40. Pollution of air, water and soil has reached alarming levels in many places in the region and poses serious threats to human health and ecosystems. According to recent WHO estimates, in 2012, more than five million deaths in this region were attributable to air pollution, with indoor and outdoor air pollution causing approximately the same number of casualties (WHO, 2014b). Pollution is also having a significant negative impact on economic activities. For example, many countries are experiencing large losses in crop production as a result of pollution. Hazardous air pollution is causing some cities to restrict ordinary outdoor activities, especially for school age children, creating difficulties in attracting and keeping foreign investment and skilled foreign and domestic labour. The media has contributed to increasing public awareness on these serious challenges, especially related with pollution in cities, and citizens in many countries are now demanding quick and effective actions of their governments. In rural areas in particular, indoor air pollution caused by the burning of fuels for cooking and heating remains a severe health hazard that requires more attention.

41. For all types of pollution, the first step is to strengthen pollution standards and regulations, and the second step is to enforce them effectively. For example, WHO has established guidelines for a range of air pollutants but many countries in the Asia Pacific have weaker standards (CAI-Asia, 2010). No ASEAN country had fuel economy standards as of 2010 despite obvious cost savings and energy security benefits (50by50 & CAI-Asia, 2010). Developing countries may need capacity building assistance in order to strengthen standards and their enforcement.

42. For reducing pollution, economic approaches are necessary. Energy and resource efficiency, renewable energy, and sustainable transport are key for reducing pollution, especially air pollution. The 3Rs are key approaches for reducing waste and resource use, which in turn reduces pollution. Some countries in the region have broader economic policies or concepts with the potential to promote cleaner production such as Green Growth in Korea; China's Circular Economy, the concept of Green Development, and the Blue Sky Science and Technology Project; and Japan's Sound Material Cycle Society.

43. Cleaner production is a business strategy that can increase profits by reducing waste in the production process to cut costs or finding an economic use for the waste to generate new business. Governments can provide regulatory advantages to companies with cleaner production processes such as increasing the costs of waste generation and disposal and or subsidies for cleaner technology. For cities, establishing effective systems for collection and treatment of sewage can help authorities achieve their objective of protecting residents' health. Decentralised systems and ecological treatment systems can play important roles as complements to large-scale conventional wastewater treatment plants.

44. A co-benefits approach can reduce the costs of pollution since different kinds of pollution often have common sources. The co-benefits approach can also be applied to other areas such as transport, waste, and buildings (Puppim De Oliveira et al., 2013).

45. Integrated land-water management strategies as well as improved governance and capacity building are necessary in order to reduce pollution of land and water resources. Governance strategies should include multistakeholder participation and community-based resource management as well as market-based strategies (UNEP, 2012b). Reducing leakage of nutrients from agriculture requires awareness raising and capacity building of farming communities, and support for adopting improved farming techniques. Approaches that have potential for realising multiple benefits include low-input and organic farming, integrated agriculture, non-till farming, agroforestry and permaculture.

## **F. Ensure sound management of chemicals and wastes**

46. In most of Asia and Pacific n, inappropriate management of waste and chemicals is a serious threat to human health and ecosystems. Large and growing volumes of uncollected waste, waste dumping with little or no equipment for environmental protection, open waste burning, and release of untreated sewage to recipients are part of the reality in many cities (UN-Habitat, 2010). At the same time, the generation of complex and hazardous waste fractions that require special care, such as electronic waste, medical waste, and industrial waste is also on the rise. In addition, recycling – which has potential environmental benefits in many cases – is often carried out with basic techniques and inadequate protection, causing pollution and exposing workers to hazards (Tsydenova & Bengtsson, 2011).

47. Technologies for dealing with these challenges are readily available. For example, biodegradable waste, by far the largest share of municipal solid waste, can be composted or used to produce biogas. Investments in such low-cost options can drastically improve the sanitary conditions, reduce greenhouse gas emissions, save money for local governments as a result of the reduced need for transportation and disposal, and also generate green jobs. It is estimated that the organic waste fraction produced annually in Asia and the Pacific region has a potential economic value of more than US\$700 million,

if used for either compost or biogas generation (ADB, 2011). Additionally, establishment of collection systems and safe treatment facilities for hazardous waste fractions would have significant health benefits. Materials recycling, which is currently to a large extent done by the informal sector, can gradually be upgraded and formalised. Training of informal recycling workers may be needed in order to avoid unintended negative impacts on livelihoods. Policies based on the principle of Extended Producer Responsibility (EPR) can help to mobilise financial resources for such upgrading.

48. Product repair and reuse are common in most countries in Asia Pacific. These practices can reduce both the demand for natural resources and the generation of waste, and they also offer livelihood opportunities. However, as countries go through the process of modernisation these practices tend to lose ground. There are strong reasons to support these sectors in order to protect the valuable functions they perform in society's utilisation of materials.

49. Similarly, agricultural and industrial chemicals are increasingly used in the region (UNEP, 2012b). Many of these substances have known or suspected hazardous properties, and for most of them there is insufficient information available to properly assess hazards and risk. The monitoring systems for how chemical substances are dispersed, transformed or accumulated are under-developed and provide insufficient information for safe management. Ensuring safer chemicals management requires a range of government interventions, including for example: stricter requirements for corporations to conduct testing and to disclose information; expanded bans of especially problematic substances; proper inspections and enforcement of regulations; education and awareness raising among key groups such as farmers and workers in chemicals-intensive industries; promotion of effective substitutes, such as biological pest control methods; and expanded monitoring systems for tracking the environmental fate and impacts of chemical substances.

## **G. Improve scientific understanding of environmental issues and linkages with development**

50. Environmental issues and their linkages with development are highly complex. Access to scientific knowledge is indispensable for understanding and effectively addressing these challenges and for reaping development synergies. Knowledge from natural sciences is obviously needed but also the social sciences and humanities have to be more engaged given that a transition to sustainability will require changes in behaviour, social norms, and institutions.

51. Better systems for data generation and monitoring of the region's environment need to be established. To make data useful for policy making there is also a need to strengthen analytical capacity. These efforts are needed at national and sub-national levels, but also at the regional level, reflecting that many environmental problems transgress national borders. Good coordination of national and regional efforts and clear role sharing is needed for effective capacity strengthening.

52. Decision makers in governments, as well as in the business community, need to be aware of how the development process impacts and depends on the environment. Awareness-raising among the general public, utilising channels such as formal education and the media, is also essential. Decision makers need to have easy access to updated scientific findings and the possibility to make the research community aware of emerging knowledge needs. National platforms and other mechanisms for interaction between

researchers and policy makers, including politicians as well as government employees, therefore need to be strengthened.

53. At the international level, a number of panels, such as IPCC, IPBES and IRP, as well as periodic assessments such as the Global Environmental Outlook (GEO), have been set up to summarise scientific findings and suggest policy implications. The findings of such international initiatives need to be effectively communicated to key decision makers at national and sub-national levels and also disseminated to the general public.

#### **H. Use the SDGs to mainstream sustainability and for mobilising stakeholders**

54. To embrace new development directions and take advantage of emerging frameworks such as the SDGs, governments need to rethink their institutional arrangements to better reflect the need for more effective coordination, implementation, monitoring and reporting of progress towards sustainable development. The upcoming SDGs require a new approach to development. The launch of this high-profile global agenda provides an opportunity for governments to reconsider their routines and their policies. The new development agenda is broad and challenging; successful implementation will require good coordination across policy domains and economic sectors. Sustainable development has often been regarded as the responsibility mainly of ministries in charge of environmental protection, while the Millennium Development Goals (MDGs) have often been considered to be mainly about Overseas Development Assistance (ODA). The SDGs require a different whole-government approach. Coordinating government bodies, such as ministries of planning and finance, need to be fully engaged. The perspective that environmental protection is a necessary precondition for poverty alleviation, human wellbeing and long-term prosperity needs to guide governments' strategic development planning.

55. However, governments alone cannot deliver on the new development agenda. The whole society has to be engaged and the active involvement of key stakeholders needs to be leveraged. In this regard, the SDGs are fundamentally different from the MDGs, which mainly targeted low-income groups and could be implemented by sectoral experts. SDGs are universal, and apply to all countries and all people. In order to leverage stakeholders, governments can promote transparency of the planning and policy making process.

56. Achieving the SDGs, as well as national development objectives will need engagement of all levels of government, beyond just environment ministries and agencies. With environmental concerns threatening national development strategies and economic growth plans, the present institutional arrangements constrain the necessary role of environment ministries. Governments should revise their institutional arrangements in alignment with the new integrative understanding of alternative development pathways. This would better enable environment ministries to harness the SDGs framework in support of national objectives. This includes renaming environment ministries to a more suitable reflection of their elevated cross-coordinating function, increasing their capacities to reflect demands of their roles, and repositioning them within the government with higher authority to ensure critical concerns to environment, social and economic integration are appropriately reflected. Three examples below from Asia and the Pacific provide early lessons:

- In Sri Lanka, for example, SDGs are placed directly under the President, who is the Chair of the National Council for Sustainable Development;



- Bhutan established indicators that cut across and direct all agencies of government planning and development. The Constitution directs the State “to promote those conditions that will enable the pursuit of Gross National Happiness”, ensuring that improving the GNH index is the basis for decision making by all government agencies;
- Mongolia combined environment and green development into one ministry – the Ministry of Environment and Green Development – and gave it a coordinating function, along with the Ministry of Finance. It also chairs a permanent coordination committee.

## **I. Adopt new ways of measuring progress**

57. Examples such as China’s Green GDP efforts show a growing awareness that the widely used System of National Accounts upon which countries calculate the GDP and GNP falls short of the social aspirations of achieving human well-being within planetary boundaries. To track progress towards sustainable development and provide accountability, there is need to subordinate or replace the GDP as the primary indicator of national development.

58. Bhutan’s Gross National Happiness (GNH) concept is an example of a shift away from using GDP as a basis for assessing development to using a new system that incorporates social and environmental dimensions of sustainability. GNH is pursued through a set of four key strategies, called pillars: sustainable and equitable socioeconomic development; environmental conservation; preservation and promotion of culture; and good governance. Recognizing the difficulty of measuring GNH in quantitative terms, Bhutan has started developing indicators. Currently, it uses 33 indicators in nine different clusters, representing a variety of factors that influence well-being.

59. Other ongoing initiatives that could help countries adopt alternative indicators to the GDP that place individual and societal well-being at the centre of development and prosperity in society include the Genuine Progress Indicator, the Human Development Index, and the Human Wellbeing Index. Instead of national income accounting, the Human Development Index has a comparative measure of life expectancy, standards of living, education, and literacy. The Gini Coefficient measures income inequality. The Ecological Footprint is being increasingly used to indicate the effects of consumption on the planet and resource potential for future generations.

## **J. Align national budgeting and finance with sustainable development**

60. The UNEP Inquiry into the Design of a Sustainable System has identified potential options in Asia Pacific to promote a more sustainable financial system (UNEP 2015b). Recommendations where Ministries of Environment can potentially play an advocacy and advisory role in partnership with Central Banks, Ministries of Finance and the private sector include inter alia:

- Sustainable banking*: Bangladesh, China and Indonesia have demonstrated the potential of establishing ‘green credit’ risk management and reporting requirements, offering green fiscal incentives and considering variations in capital weightings to account for mispriced environmental risks and broader policy needs.

- ii. *Green bonds*: with under-developed but fast growing bond markets, the region has the opportunity to lead in green bond issuance and benefit from their associated use of proceeds for green infrastructure and enterprise development.
- iii. *Stock exchanges*: the Stock Exchanges of Thailand, Singapore and others have led in the region in requiring listed companies to provide investors with material information about their social and environmental performance.
- iv. *Green budget tax reform* allows governments to influence market prices through public policy and internalise the costs of environmental degradation. This can be done either directly, through the national accounts, or indirectly, through fiscal policy.
- v. *Reducing fossil fuel subsidies*. Reducing these subsidies can free up funding for sustainable development and promote low carbon growth. Consumer fossil-fuel subsidies across emerging and developing Asia totalled US\$104 billion in 2011 (IISD 2014). This represents a significant stream of potential financial resources within the region that could be redirected away from subsidies and towards broader sustainable development goals (Merrill & Chung, 2014). The government of Indonesia recently started taking steps to reform its energy subsidies. Consumer energy subsidies alone have amounted to around a 3.1 per cent of GDP since fiscal year 2010 (IISD, 2014). Instead of helping the poor as intended, the subsidies have tended to benefit those with higher incomes.
- vi. *Mainstreaming environment into national budgeting processes*. There is potential to mainstream climate change and environment into national budgets and budgeting in order to assess and potentially reallocate spending to achieve national environmental and climate change priorities. Examples include carbon emissions tagging systems in the national budget as developed by the Ministry of Finance in Indonesia, sustainable public procurement and Climate Public Expenditure and Institutional Reviews (CPEIRs) used to assess current environment related expenditures and institutional arrangements.

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