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Financial mechanism (Convention)

Matters relating to the implementation of decision 5/CP.8

**Experience of international funds and multilateral financial institutions
relevant to the investment needs of developing countries in
meeting their commitments under the Convention**

Note by the secretariat

Summary

The Conference of the Parties, by its decision 9/CP.10, requested the secretariat to prepare a report containing information that is relevant to addressing the future investment needs of developing countries for the purposes of fulfilling their commitments under the Convention, based on the experience of international funds and multilateral financial institutions. It requested the Subsidiary Body for Implementation to consider this report at its twenty-third session.

This report contains information from the national communications under the Convention from Parties included in Annex I to the Convention (Annex I Parties) and Parties not included in Annex I to the Convention. It also contains information from reports and databases of multilateral financial institutions and bilateral agencies of Annex I Parties, and international funds. It highlights areas of investment needs of developing countries, and trends and patterns of activities and experiences of financial institutions relevant to these needs.

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I. Executive summary

A. Introduction and background

1. The Conference of the Parties (COP), by its decision 9/CP.10, requested the secretariat on the basis of the **experience of international funds and multilateral financial institutions**, to compile information that is relevant to address **future investment needs of developing countries** for the purposes of fulfilling their commitments under the Convention. It also requests the secretariat to make this compilation available to the Subsidiary Body for Implementation (SBI) at its twenty-third session (November 2005).
2. This report is based on information contained in the national communications (NCs) of Parties not included in Annex I to the Convention (non-Annex I Parties) and Parties included in Annex I to the Convention (Annex I Parties) submitted to the UNFCCC secretariat, the texts of the Convention and the Kyoto Protocol, reports of the Intergovernmental Panel on Climate Change (IPCC), reports and publications of international funds and multilateral financial institutions and related databases that are publicly available.
3. The **policy and analytical framework** of the report is defined by the investment needs of developing countries to meet their commitments enshrined in the Convention, in particular commitments under Article 4.1, and by commitments of developed countries under Article 4.7. It is also defined by decision 9/CP.10, whereby the COP requested a compilation of information that is relevant to addressing the future investment needs of developing countries to implement the Convention.
4. The future investment needs are linked to the implementation of activities, projects and programmes relevant to climate change that are defined by broader policy objectives and relevant drivers. By their very nature, these drivers encompass a very high level of uncertainty. In addition, developing-country Parties have already taken some steps to implement their commitments under the Convention, but given the general nature of these commitments, the extent of their implementation in the future and related investment needs is highly uncertain. Hence, the report focuses on the **current and near-term investment needs in climate and climate-related activities and measures in developing countries**.
5. The information compiled in **this report is supplemental to the previous report** prepared by the secretariat (FCCC/SBI/2004/18) in that it focuses on investment needs, which by their nature are linked to financing in infrastructure, technology, and equipment, mostly relating to adaptation and mitigation, whereas the previous report focused on broader funding needs, including needs relating to capacity-building, technology transfer and education, training and public awareness.
6. Also, whereas the previous report centered on the activities of the Global Environment Facility (GEF), in line with the mandate, the current report focuses on activities and experiences of multilateral financial institutions, also known as multilateral development banks (MDBs) and international funds that are relevant to the investment needs of developing countries to implement the Convention. As these activities and experiences in many cases are aimed at leveraging private investment (of private infrastructure investors) and are linked to investments specifically targeting emission reductions, or are linked to such reductions, such private investments are addressed as well. Financial flows provided through development agencies of developed countries on a bilateral basis in the context of official development assistance (ODA) and experiences of the export credit agencies (ECAs), which substantially influence the type of private investments made in the developing countries, are also covered. The report aims at providing **an overview of major external sources of investment relevant**

to meeting the commitments of developing countries under the Convention, rather than going in detail into particular sources, institutions, projects and programmes.

7. The MDBs, international funds and the other financial sources provide **loans and grants** to governments, and financing, such as **debt, equity and guarantees**, to the private sector in these countries (see annex I for definitions). They support investments in energy, transport, agriculture and other sectors relating to infrastructure, which are vital for economic development and may substantially reduce or increase greenhouse gas (GHG) emissions. They also support investments in climate sensitive sectors, such as the water resources sector, which are relevant to adaptation. All these types of investments and sectors are covered in the report.

B. Areas of investment needs of developing countries for fulfilling their commitments under the Convention

8. The information on the investment needs of developing countries for fulfilling their commitments under the Convention is compiled based on information reported in 124 NCs of developing countries received by the secretariat by June 2005. This information, with regard to mitigation, is augmented by proposals for financing of projects which may reduce emissions or enhance removals, submitted by developing countries on a voluntary basis according to Article 12.4 of the Convention (FCCC/SBI/2004/INF.16 and FCCC/SBI/2005/INF.8).

9. Given that the main purpose of the NCs is not to report on investment needs, and therefore quantitative information on such needs is rarely provided, this report summarizes information on investment needs in a **qualitative way based on the relevance of the areas of investment needs and the information reported in the NCs to the adaptation and mitigation measures and programmes of developing countries. This is supplemented by illustrative examples of individual countries' quantitative assessments of their investment needs** for specific projects, measures and sectors. This implies that the information on the areas of investment needs of developing countries as summarized in this report could be further augmented with information from second and subsequent NCs, where the issue of investment needs could be given more prominence. It could be augmented further with information from sources other than the NCs, if deemed necessary by the Parties.

10. The need to further augment the information on investment needs is underpinned also by the **growing interest by developing countries to identify and implement adaptation activities**, for which sufficient information is available, in implementing the Convention and in response to a growing number of important decisions on adaptation that came out from the Marrakesh Accords adopted by the COP at its seventh session, the New Delhi Ministerial Declaration adopted at COP 8 and the Buenos Aires programme of work on adaptation and response measures adopted at COP 10.

11. In the mitigation and adaptation sections of the report, the information is compiled by the relevant key social and economic sectors within which measures have already been implemented, are planned, or could be implemented to fulfil commitments under the Convention and to address socio-economic development goals. These sectors, therefore, provide a **compilation framework** for the information on adaptation and mitigation measures and activities where investments are needed. Broad cross-cutting issues including technology transfer, capacity-building and Article 6 activities, which have become increasingly important within the Convention process, are only noted in this report in the context of investment needs for adaptation and mitigation, as they were covered in the previous report.

12. In identifying measures for adaptation and mitigation, developing countries, according to the information reported in their NCs, were guided by the aim to fulfil the commitments as enshrined in Article 4.1 of the Convention. They were also **guided by the three principles enshrined in the Convention**, namely, eradication of poverty, avoiding risks to food production and promoting

sustainable development, with the clear understanding that climate change may threaten to undermine efforts to deal with poverty and promote sustainable development. The developing countries also **remained mindful of the link between both adaptation and mitigation**, in that some adaptation measures in specific sectors, particularly those in agriculture, land-use change and forestry, can conserve resources, reduce production cost and restrict the release of carbon from soil, and therefore have GHG mitigation effect as well.

1. Adaptation

13. The impacts of climate change according to the IPCC are expected to be more striking in developing countries, because of their geographical and climatic conditions, their high dependency on natural resources and their limited economic, financial, human and institutional capacity to adapt to climate change. Climate change is expected to further reduce access to drinking water, negatively affect the health of poor people and pose a threat to food security in many of these countries. Therefore, adaptation appears as a critical response strategy of developing countries to climate change. Importantly, it emerges as a priority in achieving broader longer-term objectives of these countries for poverty eradication and sustainable development. Many of these measures not only can address vulnerability particular sector, but also can bring co-benefits in other areas and sectors that are vulnerable to climate change. The **investment needs for adaptation** identified in this report by their very nature are linked to the physical and infrastructure investment in measures relating to technology, practices and planning, and do not cover other measures.

14. **Water resources** are basic for all life on earth and for all economic sectors, in particular for agriculture and industry. Even in the absence of climate change, management of water resources poses two major problems globally: ensuring quality and quantity. This is a particular problem for developing countries, where the number of people affected by water scarcity is expected to almost triple from 1.7 billion today to 5 billion in 2025 and where water resources have broad poverty and macroeconomic impacts.

15. The adaptation measures that have been frequently identified include: increasing water supply; promoting water conservation; ensuring control on water demand; establishing flood and drought monitoring, forecast, control and protection systems; enhancing watershed management to allow for coordinated solutions in the whole river basin to the problems of water supply, quantity and quality; ensuring control and abate water pollution; ensuring long-term integrated water resources management with land use, cropping pattern, and zoning; and employing biotechnology for higher crop yield with lower water requirement.

16. Investments are needed to implement practically all of the enumerated measures. Many developing countries have sought approaches and solutions that combine several of the adaptation measures for the water resources sector with adaptation in other sectors, in particular, agriculture and forestry, and in the context of broader development goals. In many cases these approaches were defined by the understanding that water resources are affecting both the structure and performance of national economies and countries' ability to eradicate poverty.

17. **Agriculture** is the most important sector of the economy for many developing countries. In the majority of them, it is a sector highly dependent on and sensitive to climate. Climate change and its negative impacts on food production, food security and employment provided by agriculture will add to the stress on agricultural resources, which originates from the pressure from population growth and a series of other socio-economic and environmental pressures.

18. Many developing countries considered the adaptation measures in agriculture in a broader social and economic context by taking into account changing social and technological conditions, population

pressures, environmental degradation, soil erosion, deforestation, and increasing poverty in rural areas. These measures included: changing agronomy of crops; improving and conserving soils; improving irrigation area, methods and efficiency; promoting water and soil conserving techniques and practice; promoting biogas to achieve multiple benefits; supporting agricultural research and transfer of technology; developing or introducing crops that are resilient to heat, drought and pests; improving service, market and infrastructure for agricultural enterprises and products; developing early warning systems for disaster preparedness and introducing crop insurance; improving pest and disease forecasting, monitoring and control; and expanding the use of organic compost and technology.

19. Practically all measures enumerated in agriculture are linked to some changes in agricultural methods and practices, and are more related to human, infrastructure and institutional capacity-building and related funding than to investment needs. Yet, with only a few exceptions, implementing these measures will also require new investments.

20. Adaptation in **coastal zones management and marine resources** is important given that more than half of the world population lives within 100 km of the coast and that this number could rise further. The coastal areas contain diverse and productive habitats important for human settlement, development and local subsistence. Coastal resources are vital for local communities and indigenous people. For small island developing States (SIDS), the coastal zone is the area most available for any development activities.

21. Developing countries with coastlines of sea or lake and SIDS are inevitably those that set as a priority measures to adapt to adverse impacts of climate change. These include measures to address sea-level rise, salination of farmland due to saltwater intrusion, higher water temperature and more stormy weather, and measures to deal with the impact of climate change on marine resources and ecosystems. These measures fall into two categories. The first category includes physical and structural measures, such as to ensuring protection from sea-level rise; reforming infrastructure in a way to be adaptive to sea-level rise, increase in temperature and extreme weather; and withdrawing and relocating communities, infrastructure and development from threatened coastal zones. The second category includes “soft” measures and approaches, such as promoting land-use planning and control, integrated coastal zone management, and economic incentive to prepare for disasters.

22. Investment will be needed in physical and structural measures. However, some of the “soft” measures as mentioned above may also require investment. Investment needs can, therefore, be linked with all physical and infrastructure measures and to some extent to “soft” measures.

23. **Forest and eco-systems management** is a priority for adaptation for many developing countries because climate change can reduce wood and non-wood production, intensify land erosion, particularly in arid or semi-arid areas, change the natural regeneration of forests, increase pest and fire, destroy and fragment habitats, affect wildlife and biodiversity, and change the hydrological cycle, which has an impact on water resources. Many developing countries have realized that loss of biodiversity and the destruction of ecosystems, aggravated by climate change, are long-term and irreversible in many cases.

24. Given the lack of knowledge and higher uncertainty involved in assessment of impacts and adaptation vis-à-vis forests and ecosystems, some developing countries suggested that no-regret, or win-win adaptation strategies and measures that promote social and economic development in addition to enhancing adaptation be given priority. The following adaptation measures, identified by many countries, are aimed at conserving biodiversity and combating soil erosion and desertification: promoting natural regeneration in degraded forest lands; increasing support to afforestation and reforestation, promoting agroforestry; promoting in-situ and ex-situ conservation of plant and animal species; adopting sustainable harvest, use and management of forests; identify, restore, protect, recover and link conservation areas; preventing and controlling desertification and minimizing woodland

destruction; and preventing forest fires, pest damage and burning of crop residue. Investment needs could be identified in relation to all these measures. Investment could also be identified in relation to other measures, such as modernizing of forest-based industries.

25. **Human health** could be affected by climate change as the prevalence of many diseases depends largely on local climate. According to the IPCC, climate change and its impact on local climate can enhance vector-borne and water-borne diseases, especially in the tropics (IPCC, 2001b). In particular, higher temperature, increased water stress, deterioration of water quality and more frequent and more severe extreme weather events could harm human health and could result in a greater loss of life and epidemics.

26. Developing countries that are more susceptible to vector-borne and water-borne diseases have identified measures and actions to adapt to possibly worsening health conditions relating to changing climate. These measures and actions fall into two broad categories. The first category comprises direct adaptation measures, such as developing, improving or introducing more effective drugs, vaccines and medications; promoting research on how diseases are transmitted; immunization; and improving community access to adequate water, sanitation and basic health care. The second category comprises indirect adaptation measures, such as improving general hygiene and welfare of populations, and providing sufficient shelters during floods or cyclones; promoting public education on preventive methods and habits; and strengthening surveillance and monitoring systems.

27. Defining investment needs in the area of human health solely based on the information reported in the NCs is more difficult than for the other sectors. In addition, whereas investments in adaptation in the other sectors could hold expectations of some financial return given that in addition to adaptation, there would be multiple benefits, such financial returns are difficult to define in the health sector, which is mostly public. Also, measures in this sector mainly address education and capacity-building that are not directly addressed in this report. Therefore, the health sector is the sector which most needs further information to assess investment needs.

2. Mitigation

28. Emphasizing the need for developed countries to take the lead in combating climate change in line with the principles of the Convention, many developing countries have identified and implemented mitigation measures and actions, and reported thereon in their NCs. These measures have been **closely linked to and in many cases constituted an integral element of the sustainable development strategies** of developing countries, or of their broader social and economic development plans. Given that the impacts of climate change will be felt largely by the poor, many mitigation measures were implemented with a dual goal of addressing climate change and alleviating poverty. A clear priority was given to no-regret measures that help to slow GHG emissions growth while promoting social and economic development through comprehensive policies, integrated planning, and technologically and environmentally sound practices.

29. Implementation of **virtually all mitigation measures is related to investment in technology, equipment and infrastructure**. In this sense, the summary of measures provided herein is also a summary of areas of investment needs of developing countries for fulfilling their commitments under the Convention with regard to mitigation. There are exceptions. For example, mitigation of agricultural emissions could be achieved through changes in agricultural practices and might not necessarily require investments.

30. **The energy industry** is a major, and for some developing countries the most important, source of GHG emissions. Many developing countries expect the importance of energy as a source of emissions to increase with increase in population and expansion of industry and related energy services. Most of

these countries import large quantities of fossil fuel to meet their increasing demand for energy, driven by economic development and the need to lift people from poverty. Mitigation in the energy sector is, therefore, seen by many countries as a way to ensure more efficient use of energy, manage energy demand and reduce reliance on imports.

31. The energy sector has been targeted by a large number of measures, the majority aimed at promoting renewables and energy efficiency. These measures and related investment needs have included: improving fuel conversion efficiency in electricity generation; promoting renewable energy; promoting use of biomass and waste for energy; improving the fuel conversion efficiency in energy production, other than power, e.g. in oil refineries; supporting and financing for decentralized electricity generation, particularly in rural areas; reducing energy losses in transmission and distribution systems; promoting cogeneration; and promoting clean coal technology.

32. GHG emissions resulting from **energy use in industry** constitute the second largest source of energy-related emissions in developing countries as a whole. This, however, holds true mainly for countries with more industry and/or which are undergoing rapid industrialization, whereas for the other countries the share of these emissions is relatively small.

33. Yet, many developing countries have developed and implemented mitigation measures in this sector. Indeed, improving energy efficiency and material efficiency were among the most frequently implemented measures. They have been seen not only as measures to address climate change mitigation, but also as measures that often help to reduce production cost and minimize waste, improve the output-to-input ratio, and, thus, bring economic and environmental benefits. Measures aimed at energy and material efficiency and related investment needs encompass: improving in energy conversion efficiency of key generic equipment; improving energy-use efficiency in various production facilities; promoting of fuel switching from biomass and firewood to liquefied petroleum gas (LPG) or natural gas; reducing energy use through material substitution; and promoting heat recovery from different industrial processes.

34. Emissions from **industrial processes** are insignificant for most of the developing countries, except those undergoing rapid industrialization. Yet several measures and related investment needs were identified in this sector focusing on non-metal material production, such as technical upgrading in cement, lime and phosphate production; modification of wet-type cement production to dry-type; and in the aluminium industry.

35. **Energy use in the residential, commercial and public sectors, also known as sector “others”** in developing countries accounts for a share of emissions that is less substantial compared to emissions from the energy industry and energy use in industry. This is largely due to the lower energy consumption level, which in turn relates to the lower living standards in most developing countries. With growth in living standards, the emissions from this sector are expected to grow fast.

36. Mitigation measures in these sectors were mainly relating to energy saving and were associated with other policy goals for sustainable development in many developing countries, such as improved sanitation, health and housing conditions, better public services and overall better quality of life. The most frequently implemented or planned measures (and related investment needs) include improving efficiency of, and reduction in emissions from, cooking stoves; promoting the use of more efficient household appliances; enhancing efficiency of lighting; enhancing efficiency in the building sector; and promoting solar energy for water heating in the residential sector.

37. The contribution of **transport** emissions in the overall emission profile of developing countries is small compared to that of developed countries. Yet, emissions from the transport sector in many countries with booming economies have been growing fast in recent years. The growth of transport and

related emissions has been a reason for a major concern in these countries, primarily because of problems of urban air pollution, congestion, severe health problems and deteriorating life quality. Solutions for mitigation of emissions from transport were seen in the context of the broader goal to promote sustainable transport and associated changes in infrastructure.

38. Mitigation measures in transport often addressed, in addition to emission mitigation, several problems relating to promoting sustainable transport and also helped to slow the growth of demand for oil products, which are predominantly imported. The measures that are most frequently addressed (and their associated investment needs) include: improving fuel efficiency of vehicles; introducing and promoting the use of alternative energy; developing sustainable mass transport systems; improving transport planning and control; and optimizing transport infrastructure.

39. For many developing countries, **agriculture** is not the largest source of GHG emissions, although it is significant compared with agriculture in developed countries. Nonetheless, mitigation measures in agriculture are often seen as no-regret measures due to their other benefits. Frequently identified mitigation measures and associated investment needs include: increasing carbon storage in agricultural soils; adopting manure management techniques for CH₄ collection in combination with biogas production for fuel; and improving the efficiency of the use of nitrogen fertilizer.

40. A large number of measures and projects were proposed by developing countries aimed primarily at mitigation of CH₄ emissions from livestock and rice production. Measures targeting these emissions, which have a substantive investment component, include improving management of ruminant animals and improving rice production practices.

41. **Land use, land-use change and forestry** (LULUCF) is the second major source of emissions for developing countries as a whole. For some countries, particularly in Latin America and Africa, and a few in Asia with an extensive forest sector, LULUCF is the largest source of GHG emissions, mainly due to deforestation. Mitigation in this sector is, therefore, among the key climate responses for these countries, and involves major investment.

42. The mitigation measures in the LULUCF sector and associated investment needs include: promoting forest conservation and restoration, afforestation and reforestation; improving forest management practices and promoting sustainable forest development; encouraging conservation and substitution of fuelwood; and promoting and developing agroforestry.

43. The GHG emissions from waste and **waste management** account for a small portion of total emissions from developing countries. However, with population growth and increasing urbanization in many countries, mounting waste problems pose an increasing threat to local environments and air quality, in addition to increasing GHG emissions. Discharge of unprocessed waste water is threatening water resources and affecting the availability of drinking water. Mitigation measures in the waste sector can, therefore, generate substantial co-benefits for local environments, health and safety.

44. GHG emissions from the waste sector come from two sources: solid waste (handling, treatment and management) and waste water (mainly from sewage municipal waste water). Mitigation measures by most developing countries focus on solid waste. Efforts and related investment needs centre on reducing waste generation at source; promoting integrated waste management; promoting waste recycling; and promoting composting. Mitigation measures dealing with waste water centre on recycling and treatment of municipal waste water, and recovering methane from waste-water treatment as biogas.

C. Experience of international funds and multilateral financial institutions relevant to climate change mitigation in developing countries

45. The focus in the compilation of information in the report was on breadth rather than depth, in that the report provides a comprehensive description of major external sources of investment for, and relevant to, climate change mitigation in developing countries. Most of the investment was made to help countries develop, and was not exclusively for climate change mitigation. Without delving deeper into institutions and activities, it would be difficult to ascertain the impact of investments on emissions.

46. Efforts were made to collect and analyse as much data as possible and to present them in a consistent way for the **entire period between 1994 and 2003**. United States dollars were used as the common currency in which to express the results, **adjusted to 2002 dollars for time series data**.

47. Two major types of investment for mitigation are considered in this paper. The first type includes **“core mitigation investments”** in the relevant sectors, which consist of investments self-defined by the source of investment as being made for emission mitigation purposes, as well as investments made in sectors or projects that by their very nature are likely to reduce emissions, such as renewable energy. The second type of mitigation investment includes a broader category of **“climate relevant investments”** in the relevant sectors, and consists of all investment in sectors with significant emission impacts, which could be positive or negative. For example, many investments in industry may reduce GHG emissions by replacing existing production methods with cleaner and efficient technologies.

48. Given the wide variations in data sources, collection methodologies, analytical assumptions, reporting formats, currency, timing and other factors discussed in depth in the report, it is difficult to offer a precise aggregation of the investment data across the investment sources considered for mitigation. Indeed, one of the key findings of the compilation of information is that substantial gaps and inconsistencies exist in the available data. A wide variety of reporting scopes, periods, methods and motivations were encountered and every effort was made to present and analyse these data in a consistent way. Yet, the report provides some broad and initial indications of the relative scales and trends of investment made by different types of investors in developing countries for which data were located. It also includes a summary for 2003, the year for which the most complete data were available.

49. With the international community becoming increasingly aware of the impacts of climate change, the World Bank Group, (referred to hereinafter as the World Bank), the African Development Bank (AfDB), the Asian Development Bank (ADB), the European Bank for Reconstruction and Development (EBRD), the Inter-American Development Bank Group (IDB) and many other **MDBs responded by increasing their attention to mitigation and mitigation-related projects and activities** throughout the 1990s and at the beginning of the present decade. A few of these occur in the context of specialized lending programmes and policies relevant to climate change mitigation. Also, several banks have successfully promoted carbon funds. There are also broader environmental standards for lending projects, including procedural safeguards, technical standards, and exclusion lists restricting investment in certain activities. However, outside the GEF, the MDBs do not have a mandate to explicitly focus on projects and activities relating to climate change that might generate global benefits, which restricts the projects to no-regret and long-term strategies.

50. Since 1994, **an aggregate total of about USD 130 billion has been invested in core mitigation activities and sectors** in developing countries. The comparison of the trends of financial flows across the four sources of investments in mitigation (MDBs, ODA, ECA and private infrastructure investors) suggests that financial flows from private infrastructure dominate the core mitigation investments in developing countries, followed by investment by the ODA.

51. **Since 1994, an aggregate total of more than USD 520 billion has been invested in climate relevant sectors.** The comparison of the core mitigation investments to both the broader range of investments in climate relevant sectors and the total external investment (public and private) going to developing countries suggests that core mitigation investments remain only a small part of both climate relevant investment and total external investment in developing countries. One possible implication is that the potential for changes of climate relevant investment into core mitigation investment, and therefore, for further reducing emissions, is greater than is currently thought.

52. **In 2003 alone, total core mitigation investments amounted to about USD 8.3 billion.**¹ The analysis of the distribution of these investments across different investment sources suggests that only 30 per cent of the core mitigation investment in 2003 came from the sources most widely identified with climate relevant investments in developing countries – MDBs and ODA. Therefore, private investors, which are the major investment source (even in down years compared to the 1990s) and in many cases contribute to shifting the economic development of the developing countries towards less-carbon-intensive and more sustainable development pathways, could receive more attention to make the effort to promote mitigation a success. Also, the role of the MDB and the ECAs that support such private (and public) investment, and help to foster public–private partnerships, should not be understated.

53. As to the **sectors where the core mitigation investments were made in 2003**, the analysis underscores the dominance of the energy and transport sectors. Other sectors, such as forestry and waste management received much less investments. The distribution by region suggests that Asia (East and South) and Latin America and Caribbean received the largest share of core mitigation investments across all investment sources. This broadly replicates the investment pattern of total investments by the MDBs in developing countries. The regional investment pattern by the ODA and ECA is somewhat different, with Asia and the Pacific accounting for most of the ODA investments in core mitigation investments and the ECA investments being split almost equally among the three regions – Asia and the Pacific, Latin America and the Caribbean, and Africa and the Middle East.

54. As shown in this analysis, when considering both the trend of the core mitigation investments since 1994 and the pattern of these investments in 2003, **the largest single source of investment in mitigation activities across developing countries is private infrastructure investors.** Their investment, however, varies with broader economic conditions and is focused primarily on growing, middle-income countries.

55. ODA, which varies the least over time, is the second largest source and, in most cases, has been allocated to countries that are not receiving as much private investment. However, ODA flows are to remain smaller than overall private flows, posing the question of how best to use them to leverage greater amounts of more stable private investment.

56. Given the difficulties of locating aggregated data on mitigation investments by MDBs, it is difficult to draw precise conclusions on the volume and trends in their activities. However, it is clear that they have a major impact on many large infrastructure projects that have substantial climate implications, in that they can serve as a catalyst for the development of new financing techniques (similar to the Prototype Carbon Fund) and can leverage substantive private investment, e.g. through public private partnerships. Similar issues arise when considering the available data on investments by ECAs, as well as their importance to many climate relevant infrastructure projects.

¹ This represents a conservative, low-end estimate of core mitigation investment given the difficulties of accessing data on MDB investments, finding data on all core mitigation sectors, and breaking out investments by region.

57. Because many GEF projects are co-funded with resources from the MDBs, a comparison is made between the average MDB core mitigation investment and that provided by the GEF. This comparison suggests that GEF allocations for its climate focal area are much smaller than the MDB core mitigation investments. Together with the co-financing leveraged by the GEF projects, though, the GEF investments become comparable in scale to the MDB core mitigation investments. If climate relevant investments are taken into account, the MDBs' role in the area of mitigation becomes more prominent. This suggests that the role of the MDBs in meeting the investment needs of developing countries under the Convention, regarding mitigation, could be at least equally as important as the role of the GEF.

58. Given the different nature of the data compiled on investment needs by developing countries and the experience of the sources of investments covered by this report, it is difficult to draw conclusions about the **relevance of the experience of international funds and multilateral financial institutions to the investment needs of developing countries in the area of mitigation**. However, it became clear that areas of energy and transport, which are a priority for investments in developing countries not only because of mitigation but also to meet broader development objectives and to avoid air pollution, congestion and health problems, received the largest share of the overall investment. Also, within the energy sector, some areas of investment, such as energy efficiency and renewable energy, are increasingly supported by practically all sources of investment. Other areas of investment needs, such as agriculture, LULUCF, waste and industrial processes, received less investment from the sources surveyed.

D. Experience of international funds and multilateral financial institutions relevant to adaptation to climate change in developing countries

59. The purpose of the compilation of information on experience of MDBs relevant to adaptation to climate change is to provide a comprehensive description of investment activities across the major, external sources of investment rather than to delve deeply into any particular institutions, projects, or activities. Information for this section of the report was compiled from documents and databases from MDBs on financing of projects, activities, and programmes in natural resource sectors that are sensitive to climate change. The focus was on projects, activities and programmes implemented between 1994 and 2004.

60. The report focuses specifically on MDBs' investments in developing countries in projects, activities, and programmes associated with the development of infrastructure, technology and equipment that can reduce vulnerability to the adverse impacts of climate change. Examples of these projects include rural and urban water supply projects, seed distribution networks, and the establishment of protected areas. These types of projects are typically undertaken by public (i.e. government) rather than private entities, as they do not typically produce financial returns sufficient to attract private capital.

61. As a rule, these investments have been made to help countries develop without assuming that their climate will change. However, without in-depth analysis of each activity, it would not be possible to determine how these investments could reduce vulnerability to climate change. Nonetheless, the level of investment in each sector can be viewed as a measure of the degree of interest by the international financial institutions in developing these **sectors that are sensitive to climate change and, therefore, relevant to climate change adaptation**.

62. Unlike mitigation, where MDBs have invested in mitigation projects since the early 1990s, adaptation, although enshrined in the Convention, received attention in the international context only in recent years. With very few exceptions, self-defined projects and activities are difficult to identify. This is why the approach for compiling information on adaptation differs from that used for mitigation. The **approach taken implied considering individual projects of a number of representative institutions** to ascertain the relevance of these projects to adaptation according to a set of criteria. Yet, this does not

mean detailed examination of these projects, which might ascertain whether they would decrease vulnerability to climate change.

63. MDBs do not have any specific safeguards or technical standards for their projects on adapting to climate change. In principle, other existing policies, including those on environmental impact assessment and disaster mitigation, could trigger attention to adaptation. In practice, project documents and country plans rarely pay explicit attention to climate risks, and very rarely consider the changing risk profiles under climate change. Yet, two MDBs, which account for a larger share of projects relevant to climate change adaptation, are already gaining experience relevant for adaptation. The World Bank is currently developing a risk screening tool that will provide a quick check of potential issues that might arise in project design or implementation, provide a lead into appropriate knowledge and experience, and increase awareness of climate variability and change issues. Both the World Bank and the ADB are generating practical experience in implementing adaptation projects through a number of pilot activities.

64. **Between 1994 and 2004, the MDBs invested almost USD 300 billion in projects in the primary sectors relevant to adaptation** to the impacts of climate change. About two thirds of this investment was in water resources projects. Projects in the agriculture and food production, and disaster prevention and risk management sectors each received around 11 per cent of the total investment. Far less was invested in projects in the coastal zone and marine management and health sectors, which received about 1 per cent and less than 1 per cent of all investment funding, respectively. These results, however, reflect only the value of infrastructure investments, i.e. the basic equipment, utilities, productive enterprises, installations and services essential for development, operation and growth. They do not reflect investments in planning activities, such as feasibility studies, or in education, such as campaigns to educate the public on disease prevention.

65. Among all investment sources considered, the **World Bank is by far the largest investor in projects in sectors relevant to adaptation**, contributing 96.6 per cent of the total USD 295 billion being invested in these projects, followed by the ADB, which contributed 2.8 per cent. Investments in water resources dominated the profile of both the World Bank, where they accounted for 65 per cent of investments, and the ADB, where they accounted for 66 per cent of investments. About 30 per cent of the World Bank's investments are in the agricultural production, forest and ecosystems management, and disaster prevention and management projects, whereas most of the remainder is in coastal and marine ecosystems management projects. About 20 per cent of the ADB investments are in agricultural production and disaster prevention and risk management projects. Only about 7 per cent of its investments are in the forest and ecosystems management sector, with the remainder split between the health and coastal zone and marine ecosystems management projects. For each sector, the report reveals some similarities and differences in investment pattern across surveyed investment sources.

66. Water resources dominated investments in all of the seven world regions, as over half of all infrastructure investment in climate sensitive sectors was directed in this sector. Investments in the SIDS and the Latin America and the Caribbean region were the most diverse, with most of the remaining investment portfolio being distributed among disaster prevention and risk management, agriculture and food production, and forest and ecosystems management. Investments in the Eastern Europe and Central Asia region and the North Africa and Middle East region were the least diverse, with almost 80 per cent and more than 90 per cent of investments being devoted to water resources, respectively.

67. Given the varying nature of the data compiled on investment needs by developing countries and the experiences of investors covered by this report **it is difficult to draw conclusions, at this stage, of the relevance of the experiences of international funds and multilateral financial institutions to the investment needs of developing countries in the area of adaptation**. In addition, investment needs for adaptation show strong dependency on the national circumstances. Yet, even at this stage, it could be noted that ensuring quality and quantity of water resources, together with relevant adaptation activities,

which represent a key focus of policy intervention in the context of adaptation for a majority of developing countries, is also a high priority for the financial institutions surveyed in this report. For example, 66 per cent of investments relevant to adaptation by the World Bank have been in water resources projects.

68. Almost equal shares of the overall investments (about 10 per cent) were made in other areas of investment needs relating to adaptation, such as agriculture and food production; forest and eco-systems management; and disaster prevention and disaster risk management. Coastal zone and marine ecosystem management, which is of particular relevance for SIDS, received small but growing investments. The investments going into adaptation relating to human health are very small, but this reflects the focus of this report on infrastructure investments.

E. Conclusions

69. The information compiled from the NCs suggests that while guided by the principles of the Convention, such as eradication of poverty, avoiding risks to food production and promoting sustainable development, **developing countries have taken some steps to address climate change in the context of their commitments under the Convention, in particular under Article 4.1, and have initiated the development of response strategies to climate change.**

70. Adaptation appeared as a critical response strategy to climate change for practically all developing countries. They have identified steps to facilitate adaptation first of all in the area of water resources, but also in the areas of agriculture, human health, forests and ecosystems management, and coastal zone management and marine resources. Most of developing countries have identified steps to address mitigation as an important climate change strategy. The steps have been identified first of all in the area of energy and transport, but also in the areas of agriculture, LULUCF and waste management. Within the energy sector, these steps primarily focused on renewable energy and energy efficiency. It appeared difficult to assess, from the information available from the NCs, the magnitude of investment needs to implement adaptation and mitigation steps for individual developing countries and for the developing countries as a group. However, the examples provided for individual projects, activities and programmes suggest that **these needs are substantial.**

71. Given that the approach in compiling information on experiences of financial institutions in this report was on breadth, rather than depth, and considering the data gaps and inconsistencies identified, the results presented should be considered as preliminary ones. Yet, they allow the drawing of some preliminary conclusions on **the scope, pattern and trend in investments related to mitigation and adaptation** provided through various investment sources.

72. On mitigation, it became clear that the **major financial flows relating to mitigation come from private sector sources.** However, they vary substantially with economic conditions and centre primarily on growing, middle-income developing countries. MDBs and ECAs, though, have major impact on many infrastructure projects that have substantial implications for emissions and the potential for climate mitigation in developing countries. They have provided confidence for the private sector and have leveraged substantial private investments for core mitigation projects and for sectors relevant to mitigation. They have also been a catalyst for fostering public-private partnerships and new funds, e.g. Prototype Carbon Fund. It is encouraging that the World Bank, which leads in terms of investment volume and diversity of project portfolio, is the most active in promoting both energy efficiency and renewable energy. Other banks, such as the EBRD and ADB are also active in these areas. In addition, they have developed specialized lending programmes to specifically address climate change mitigation. The contribution by the ODA in supporting the mitigation effort in developing countries is also substantial and directed in many cases to countries that are not receiving much private investment.

73. It is also encouraging that several **MDBs have already gained substantive practical experience in all sectors sensitive to climate change that could be relevant to adaptation**, and have initiated programmes for mainstreaming adaptation into their projects. This reflects growing attention to adaptation in recent years within the overall international climate policy agenda. Although the MDBs do not yet have safeguards or technical standards relating to adaptation, this practical experience could help to shape the banks' policies to meet the growing needs for adaptation in an efficient way.

74. The varying nature of the information available for compilation for this report on investment needs and on the relevant experiences of the multilateral financial institutions and international funds does not allow the drawing of definite conclusions on the link between these two issues. However, even at this stage it is apparent that investments were made in developing countries in virtually all areas of mitigation and adaptation where needs have been identified. Moreover, some areas that appeared very important as areas of investment need, such as water resources for adaptation and energy and transport for mitigation, seem to be within the focus of the financial institutions surveyed, and these areas received the larger part of the investment flow.

75. **As to the future investment needs of developing countries to fulfil the commitments under the Convention, they are likely to grow** as the economies of these countries continue to grow, and the implementation of the Convention advances. They are also likely to grow in response to the need to support changes in technology, practices and planning that could reduce potential impacts from climate change. This poses a particular challenge for Parties to the Convention and for financial institutions. In the context of mitigation, the analysis of the core mitigation and climate-relevant investments suggests that they are part of and necessarily reflect other global investment trends. Predictable frameworks – both generally for investments and specifically for carbon assets – and opportunities for growth appeared as key factors for private investors. In addition, deciding how to apply public funds both to help lever more private investment, as well as to address areas where private funds are not likely to go, appeared as the key questions for public investors. In the context of adaptation, given the focus of the report on public investors, increased attention to potential issues relating to adaptation that may arise in ongoing project design and implementation activities could help to facilitate adaptation in the developing countries. Also, increasing of the scope and coverage of existing programmes for adaptation and channelling investments into new such programmes could contribute to this goal.

76. Given that the report provides only preliminary results, further work on investment needs of developing countries and relevant experiences of the multilateral financial institutions could encompass improving data collection and reporting. It could also encompass increasing the scope of the current compilation and the depth of the analysis. There are several possible areas for further work on data reporting and collection. For example:

- Annex I Parties could further improve the quality, transparency and completeness of information reported on the multilateral and bilateral sources of investments, such as MDB, ODA, ECA and the private sector;
- Non-Annex I Parties could improve further the quality, transparency and completeness of information reported in the NCs on the steps taken in implementing their commitments under the Convention and could report on relevant investment needs;
- Capacity of developing countries to better assess the investment needs relating to commitments under the Convention, including for adaptation and mitigation, could be further enhanced, e.g. from sources such as the GEF;
- The MDBs, in particular the World Bank, could use a more consistent reporting format and a central database for investments;

- Consideration of climate mitigation and adaptation could become an element of the ongoing efforts to improve and standardize environmental impact reporting among MDBs and ECAs;
- The use of climate change related markers for ODA related to mitigation could be expanded to include markers for adaptation, for investments in developing countries reported to the Organisation for Economic Co-operation and Development (OECD).

77. As stated already, results in this compilation should be considered as preliminary. Further research could be undertaken to extend the scope of the compilation to cover more institutions, for which information was not easily available, and to look deeper into large-scale projects to identify within the climate relevant investments the direction, positive or negative, and the magnitude of their effect on climate mitigation and adaptation. Such research could examine further the nature of, and similarities among, investment patterns. For specific groups of investors it could help to examine to what extent investment flows are consistent with the investment needs of developing countries and their commitments under the Convention in the areas of adaptation and mitigation.

II. Introduction

A. Mandate

78. The COP, by its decision 5/CP.8, requested the secretariat, in consultation with the secretariat of the GEF, to prepare for consideration by the SBI, at its twentieth session, a report on the implementation of decisions 12/CP.2 and 12/CP.3 in accordance with Article 11 of the Convention.

79. The SBI, at its twentieth session, considered this report (FCCC/SBI/2004/6) and requested the secretariat, in collaboration with the GEF secretariat, to prepare a report, for consideration by the COP at its tenth session, on the assessment of the funding necessary to assist developing countries in fulfilling their commitments under the Convention, and in order to contribute to the joint determination, with the Council of the GEF, of the amount of funding necessary and available for the implementation of the Convention as defined in the Memorandum of Understanding between the COP and the Council of the GEF (FCCC/SBI/2004/10).

80. The COP, at its tenth session, considered the report (FCCC/SBI/2004/18) prepared according to the mandate noted in paragraph 79 above. In its decision 9/CP.10, the COP noted that the report contains useful information that should be communicated to the GEF and that it shall constitute an input of the COP to the negotiations on the fourth replenishment of the GEF Trust Fund.

81. The COP, by its decision 9/CP.10, requested the secretariat on the basis of the **experience of international funds and multilateral financial institutions**, to compile information that is relevant to address **future investment needs of developing countries** for the purposes of fulfilling their commitments under the Convention. It also requested the secretariat to make this compilation available to the SBI as an information document at its twenty-third session.

B. Scope of the report

82. The secretariat based this report on information contained in NCs of non-Annex I Parties and Annex I Parties submitted to the secretariat, the texts of the Convention and the Kyoto Protocol, reports of the IPCC, and reports and publications of international funds and multilateral financial institutions.

C. Possible action by the Subsidiary Body for Implementation

83. The SBI may wish to take note of the information provided in this report when considering how to further address the future investment needs of developing countries for the implementation of the

Convention in the context of the implementation of decision 5/CP.8. It also may wish to provide guidance to the Parties and the secretariat on follow-up steps.

III. Background

A. Investment needs of developing countries for the purposes of fulfilling their commitments under the Convention

84. The policy and analytical framework for compilation of information relevant to the investment needs of developing countries for the purposes of this report is defined by decision 9/CP.10 and the relevant provisions of the Convention as described in box 1.

Box 1. Policy and analytical framework for compilation of information relevant to the investment needs of developing countries

The policy and analytical framework of the report is defined by the investment needs for developing countries to meet their commitments under the Convention, in particular under Article 4.1. These commitments include preparation of national GHG emission inventories and formulation and implementation of national and regional programmes containing measures to mitigate and adapt to climate change.

These commitments also include cooperation on technology transfer; cooperation on sustainable management of sinks and reservoirs of all GHGs not controlled by the Montreal Protocol; consideration of climate change in social, economic and environmental policies and actions; promotion and cooperation in research and systematic observation; promotion and cooperation in exchange of scientific, technical, socio-economic and legal information relating to climate change; and promoting and cooperating in education, training and public awareness. They further include commitments under Articles 5 and 6 of the Convention that further elaborate on commitments already included in Article 4.1 of the Convention.

According to Article 4.7, effective implementation of commitments under the Convention by developing country Parties depends on the “effective implementation by developed country Parties of their commitments under the Convention related to financial resources and transfer of technology and will take fully into account that economic and social development and poverty eradication are the first and overriding priorities of the developing country Parties.” Effective implementation of these commitments also depends on the extent to which developing countries are provided financial resources to meet the “agreed full incremental cost” of implementing their obligations according to Article 4.1 of the Convention.

Importantly, the clean development mechanism (CDM) under the Kyoto Protocol offers an opportunity for developed countries to obtain emission reduction credits through projects in developing countries, which could be used to meet their Kyoto emission targets. Participation in such projects contributes to achieving the sustainable development goals of developing countries and is an integral element of the overall mitigation effort.

85. Together with the need to fulfil commitments under the Convention, summarized in box 1, future investment needs of developing countries in activities, projects and programmes relevant to climate change are likely to be defined by broader policy objectives and relevant drivers, such as:

- (a) The need to meet the increasing demand for clean commercial energy to support the achievement of socio-economic development goals, through energy supply that allows environmental and health impacts of energy production to be minimized;
- (b) The need for technology leapfrogging and development of basic infrastructure, such as transport and communications, which helps to create a conducive enabling environment to attract foreign investments;

- (c) The need to minimize economic losses from the frequent occurrence of extreme climatic events and climate variability, and the threat they pose by undermining efforts aimed at achieving sustainable development and reducing poverty.

86. By their very nature, these drivers encompass high levels of uncertainty. In addition, developing country Parties have already taken some steps to implement their commitments under the Convention, but given the general nature of these commitments, the extent of their implementation in the future and associated investment needs are highly uncertain. Hence, the report focuses on the **current and near-term investment needs in climate and climate-related activities and measures in developing countries**.

87. The pattern and scale of these investment, and the lessons learned from relevant experiences, are a basis to addressing the future investment needs in that they provide an indication of possible direction and magnitude of these investment needs. As the economies of developing countries continue to grow and the implementation of the Convention advances, the investment needed to shift this growth into less-carbon-intensive sustainable development pathways, especially for economies dependent on fossil fuel and to support changes in technology, practices and planning that will reduce potential impacts from climate change, is also likely to grow.

88. The information compiled in the **current report is supplemental to the information** contained in the previous report (FCCC/SBI/2004/18). The previous report focuses on funding necessary to assist developing countries to fulfil their commitments under the Convention. This included funding for a broad range of activities linked to NCs, adaptation, capacity-building, technology transfer, regional institutions, centres of excellence, databases and systematic observation, education, training and public awareness according to Article 6 of the Convention, and projects identified in the NCs. These activities were mostly relating to institutional and human resources capacity-building, technical assistance, research, analysis and data. The current report focuses on investment needs, which by their nature are linked to financing in infrastructure, technology and equipment, mostly relating to adaptation and mitigation (see annex I for definitions used in this report).

B. Experience of international funds and international financial institutions relevant to climate change

89. The previous report prepared by the secretariat (FCCC/SBI/2004/18) focused on funding provided through the GEF Trust Fund and provided an outlook for the two new funds established under the Convention (the Least Developed Countries (LDC) Fund and the Special Climate Change Fund (SCCF)). The report noted that since the entry into force of the Convention, **financial support has been provided to developing countries to meet their commitments through the GEF**. The GEF provided such support to meet the full agreed cost for the preparation of NCs. It also provided incremental cost funding for climate change related activities in the areas of energy efficiency and conservation, renewable energy, low-greenhouse-gas-emitting technologies and sustainable transport. Other activities supported include adaptation in the areas of water resources and forestry. They also include the implementation of the USD 50 million pilot programme that addresses the linkages between adaptation and global benefits. Support for capacity-building and institutional strengthening, and technology transfer, have been provided within the framework of implementation of mitigation projects. Thus, the previous report, while focusing on the GEF, only briefly discussed relevant activities of other sources of funding, such as bilateral and multilateral sources, private capital flows and the CDM.

90. The current report focuses on activities and experiences of multilateral financial institutions and international funds that are relevant to the investment needs of developing countries to implement the Convention. As these activities and experiences in many cases are aimed at leveraging private investments, such investments are addressed as well. The report aims to provide **an overview of major**

external sources of investments relevant to meeting the commitments of developing countries under the Convention, rather than to go in detail into a particular source, institution, project or programme.

91. The first major sources of financing covered in the report are the **multilateral financial institutions** (MFIs), also known as multilateral development institutions. They aim to eliminate poverty and foster sustainable development by providing financial support and professional advice for economic and social development activities and projects in developing countries and EIT countries.

92. Typical MFIs are the World Bank and four regional development banks, which are also called **MDBs**. These banks have a broad membership, including both borrowing developing countries and developed donor countries. Although each bank has its own independent legal and operational status, they all have a similar mandate, and a considerable number of joint owners, and maintain a high level of cooperation. Other MFIs are other banks and **international funds** (IF) that lend to developing countries; these have a more narrow ownership and membership structure than the MDBs and focus on special sectors or activities. Altogether, these institutions are referred to in the report as MDBs.

93. The MDBs provide **loans and grants** to governments and financing, such as **debt, equity and guarantees** to the private sector in these countries (see annex I for definitions). The MDBs support investments in energy, transport, agriculture and other sectors relating to infrastructure, which are vital for economic development and may substantially reduce or increase GHG emissions. They also support investments in climate sensitive sectors, such as the water resources sector, which are relevant to adaptation.

94. The MDBs considered in this report are the World Bank, AfDB, ADB, EBRD, IDB, Caribbean Development Bank (CDB), Central American Bank for Economic Integration (CABEI), East African Development Bank (EADB), European Investment Bank (EIB), and the Inter American Investment Corporation (IIC). Other MDBs considered are the European Commission (EC), Islamic Development Bank (IDB), Nordic Investment Bank (NIB), and West African Development Bank (WADB).

95. Of the large number of existing international funds, the following funds are considered in this report because they either focus exclusively on supporting climate change activities or have major components relating to the implementation of climate change activities. These include the Nordic Development Fund (NDF), OPEC Fund for International Development (OPEC Fund) and carbon finance (financing made available through the carbon trade) through the World Bank (e.g. Prototype Carbon Fund, Community Development Carbon Fund and Bio-Carbon Fund). More details on the MDBs considered in the report and their experience relevant to the investment needs of the developing countries in the areas of mitigation and adaptation are given in chapters III and IV.

96. Financial flows provided through **development agencies of developed countries on a bilateral basis** in the context of ODA also contribute to meeting the investment needs of the developing countries. According to the information reported in the NCs of Parties included in Annex II to the Convention (Annex II Parties), they provided more than USD 10.2 billion to developing countries between 1997 and 1999 to support adaptation, mitigation and capacity-building through technical assistance, development and aid programmes. In addition, the export credit agencies (ECAs) are influencing the type of investments made in the developing countries and are particularly relevant for climate change mitigation given their high level of participation in energy-related projects in developing countries.

97. **Private sector investment** is becoming an increasingly important option for meeting climate related investment needs of developing countries, because most of the activities of the MBDs are linked to such investment. Hence, the private sector, including through public-private partnerships, is a key player in activities related to the implementation of the Convention. The link exists at the institutional

level, for example the private sector arm of the World Bank and the International Finance Corporation, or project level. The scale of these investments is illustrated by the United Nations Conference on Trade and Development (UNCTAD) assessment that the FDI flows increased in the 1990s and fell thereafter to USD 172 billion in 2003 (UNCTAD, 2004). Experiences of the ODA, ECA and some private investors relevant to the investment needs of the developing countries in implementing their commitments under the Convention in the area of mitigation are highlighted in chapter III of the report. Information relating to investment needs or actual investments in project activities under the Kyoto mechanisms, including CDM are not covered in the report as explained in section V.E.

IV. Areas of investment needs of developing countries for fulfilling their commitments under the Convention

A. Sources of data and limitations

98. The compilation of information on the investment needs of developing countries for fulfilling their commitments under the Convention, while advancing their socio-economic goals, is based on information reported by these countries in their NCs, see box 2. By June 2005, 124 NCs had been received by the secretariat. This information, as it relates to mitigation, is augmented by the proposals for financing of projects, designed to reduce emissions or enhance removals. The developing countries submitted such projects on a voluntary basis according to Article 12.4 of the Convention. Information on the list of project proposals is contained in documents FCCC/SBI/2004/INF.16 and FCCC/SBI/2005/INF.8.

Box 2. National communications from non-Annex I Parties

Article 12.5 of the Convention specifies that each non-Annex I Party shall make its initial national communication (INCs) within three years of the entry into force of the Convention for that Party, or of the availability of financial resources in accordance with Article 4, paragraph 3. Parties that are least developed countries may make their initial communication at their discretion.

The information in the INCs of non-Annex I Parties has been prepared following the “Guidelines for the preparation of initial communications by Parties not included in Annex I to the Convention” (decision 10/CP.2), hereinafter referred to as the UNFCCC guidelines. These guidelines require the NC to include a general description of steps taken or envisaged by the Party to implement the Convention, and any other information that the Party considers relevant to the achievement of the objective of the Convention and suitable for inclusion. According to national priorities, non-Annex I Parties may include a description of financial and technological needs associated with activities and response measures envisaged under Article 4 of the Convention. These guidelines, however, do not require non-Annex I Parties to report their investment needs for fulfilling their commitments under the Convention. The requirement on reporting financial and technical needs, although included in the UNFCCC guidelines, is not mandatory.

As a result, the degree of detail in reporting varies among non-Annex I Parties depended on national circumstances and how Parties interpret decision 10/CP.2. It also varies depending on how non-Annex I Parties interpret their commitments on climate change mitigation and adaptation according to Article 4.1 of the Convention. Yet, the INCs of non-Annex I Parties remain the most authoritative source of information on how non-Annex I Parties are implementing their commitments under the Convention and what are their relevant needs.

99. Given that the main purpose of the NCs is not to report on investment needs, this report summarizes information on investment needs in a **qualitative way based on the relevance of the areas of investment needs and the information reported in the NCs to the adaptation and mitigation measures and programmes of developing countries. This is supplemented by examples of individual countries quantitative assessments of their investment needs** for specific projects, measures and sectors. This implies that the information on the areas of investment needs of developing countries as summarized in this report could be further augmented with information from second and

subsequent NCs, where the issue of investment needs could be given more prominence. It could be augmented further with information from sources other than the NCs, if deemed necessary by Parties.

100. The need to further augment the information on investment needs is underpinned also by the **growing interest by developing countries in identifying and implementing adaptation activities**, for which sufficient information is available, in implementing the Convention and in response to a growing number of important decisions on adaptation that came out from the Marrakesh Accords adopted at COP 7, the New Delhi Ministerial Declaration adopted at COP 8 and the Buenos Aires programme of work on adaptation and response measures adopted at COP 10.

101. In all cases, **country driven assessment** will continue to be one of the important inputs to the overall assessment of investment needs of developing countries to implement the Convention. However, as noted in document FCCC/SBI/2004/18, most of the developing countries lack sufficient capacity and resources to formulate mitigation and adaptation projects and programmes, and to assess their cost and feasibility. This is especially true when such projects and programmes are undertaken in a context of larger economic development projects and programmes, and there is a need to assess the additional cost associated with more climate-friendly options. Therefore, further efforts are warranted to enhance the institutional and human resource capacity of developing countries to better assess their investment needs in a context of the implementation of the Convention and in taking into account the Convention requirements in implementing broader sustainable development projects and plans. When feasible, this assessment might be supplemented by an assessment of needs of developing countries as a group for mitigation and adaptation for a particular sector. For the present report, an indication of the possible range of the needs is provided for the energy sector, based on the United Nations publication *The Energy Challenge for Achieving the Millennium Development Goals*.

B. Approach

102. In each section of this chapter, the information is compiled according to the relevant key social and economic sectors within which measures have already been implemented, are planned, or could be implemented to fulfil commitments under the Convention and to address socio-economic development goals. These sectors, therefore, provide a **compilation framework** for the information on adaptation and mitigation measures and activities where investments are needed. Broad cross-cutting issues, including technology transfer, capacity-building and Article 6 activities, which have become increasingly important within the Convention process, are only noted in this report in the context of investment needs for adaptation and mitigation.

103. In identifying measures for adaptation and mitigation in their NCs, developing countries were guided by the aim of fulfilling the commitments enshrined in Article 4.1 of the Convention. They were also **guided by the three principles enshrined in the Convention**, namely, eradication of poverty, avoiding risks to food production, and promoting sustainable development (with a clear understanding that climate change may undermine efforts to deal with poverty and promote sustainable development).

104. The developing countries also **remained mindful of the link between adaptation and mitigation**, in that some adaptation measures in specific sectors, particularly those in agriculture, land use and forestry, can conserve resources, reduce production cost and restrict the release of carbon from soil, and therefore have GHG mitigation effect as well. Examples of such measures identified by many countries in agriculture include zero-tillage and surface seeding. Some mitigation actions, such as mitigating methane and nitrous oxide emissions from rice paddy, can improve efficiency of fertilizer use and irrigation and, hence, contribute to adaptation. Therefore, investment needs defined in the area of adaptation could to some extent meet some of the needs for mitigation and vice versa, but relevant measures and investment needs are described only once.

C. Adaptation

105. The impacts of climate change according to the IPCC are expected to be more striking in the developing countries because of their geographical and climatic conditions, their high dependency on natural resources and their limited economic, financial, human and institutional capacity to adapt to climate change (IPCC 2001a). Climate change is expected to further reduce access to drinking water, negatively affect the health of poor people and pose a threat to food security in many of these countries. Therefore, adaptation appears as a critical response strategy to climate change for developing countries. Importantly, it emerges as a priority action for achieving the broader longer-term objectives of these countries for poverty eradication and sustainable development.

106. Development and implementation of adaptation measures solely for minimizing the negative impact of climatic changes was considered risky by some developing countries in view of the large uncertainties associated with the spatial and temporal magnitude of climate change impacts. **“No-regrets” adaptation measures were, therefore, deemed necessary** to contribute to sustainable development and management of agriculture, forestry and water resources and for ensuring the livelihoods of many poor people in developing countries.

1. Approach for defining adaptation measures and related investment needs

107. The adaptation measures and relevant investment needs are compiled by sector, including **water resources, agriculture and food production, coastal zone and marine ecosystem management, human health, and forest and ecosystem management**. The selection of the key sectors for adaptation analysis is underpinned by the importance attached to these sectors by developing countries as a whole, including the importance to their economies, and by the high climate sensitivity of these sectors. It is also underpinned by the availability of relevant information in the NCs.²

108. The information by sector was compiled following a bottom-up approach from individual NCs. While following the sectoral approach in defining adaptation measures, developing countries stressed that many **adaptation measures can simultaneously address vulnerabilities of several sectors**. For example, watershed management, identified by many Parties as a measure to reduce vulnerability of water resources through water conservation, groundwater recharge and drought moderation, also has multiple benefits in sustainable food production in agriculture and generation of employment.

109. Aggregation of the adaptation measures by sector is important to outline broader trends, but **needs for adaptation by sector and related investment remain country specific** and depend strongly on national circumstances. For example, for low-lying countries and SIDS, adaptation to sea-level rise (and associated coastal-zone management) is of utmost importance as it poses unique economic, social and environmental challenges. For most of the African States, adaptation in the agriculture and food production sectors is critical for the livelihood of the population and in some cases for its survival.

110. The adaptation measures, in general, are broadly related to changes in society, institutions, technology, practices, planning and behaviour that will reduce potential negative impacts from climate change (and increase positive ones) (IPCC, 2001b). The **investment needs for adaptation** identified in this report are, by their very nature, linked to the physical and infrastructure investment in measures relating to technology, practices and planning, and do not cover other measures.

2. Water resources

² Adaptation in other sectors, such as industry, human settlement and tourism, could be also important for many developing countries. However, little information is available thereon and to some extent adaptation in these sectors could be linked to the adaptation in some of the areas already covered in this report, such as water resources, coastal zone, forest and ecosystem.

111. Water is a basic necessity for all life on earth and for all economic sectors, in particular for agriculture and industry. Even in the absence of climate change, management of water resources faces two major problems globally – ensuring quality and quantity. This is a particular problem for developing countries, where the number of people affected by water scarcity is expected to almost triple from 1.7 billion today to 5 billion in 2025, and where water resources have broad poverty and macroeconomic impacts (IPCC, 2001b). Therefore, changing climate patterns will pose new challenges for sustainable water resources management and will further exacerbate the existing problems of availability, accessibility, distribution and quality of water in many developing countries. They will also pose challenges to the use of water resources for power production, that may narrow down mitigation options of countries relying on hydro-energy.

112. This explains the emphasis placed by almost all developing countries on water resources as an area for policy intervention with regard to vulnerability and adaptation, as reported in their NCs. Many of them recognized the importance of addressing the long-term impacts of climate change in conjunction with pressing water problems. The adaptation measures that have been frequently identified include:

- (a) Increasing water supply through recharge of groundwater, rainwater storage, building reservoirs;
- (b) Promoting water conservation, through standards on specific technologies, legal restrictions on water use, amending water pricing schemes and public awareness;
- (c) Ensuring control on water demand by improving water use efficiency, reducing losses, reuse and recycling of water, and changing irrigation practices, for example to drip irrigation;
- (d) Establishing flood and drought monitoring, forecasting, control and protection system by changing or adjusting dams, canals, pipelines, pumping stations and drainage;
- (e) Enhancing watershed management to allow for coordinated solutions in the whole river basin to the problems of water supply, quantity and quality, and integration of these solutions with objectives in land management;
- (f) Ensuring control and abatement of water pollution, including in irrigation and in urban areas, to reduce pressure on water supply, drainage and sewage treatment systems;
- (g) Ensuring long-term integrated water resources management with land use, cropping patterns, and zoning, and taking climate change into account when planning hydraulic works;
- (h) Employing biotechnology for higher crop yield with lower water requirement and dependence.

113. Investments are needed to implement practically all of the enumerated measures, but firm estimates are rarely reported in NCs. Some examples of proposed projects with investment estimates are provided in box 3.

Box 3. Examples of investment needs for adaptation in the sector of water resources

Many developing countries sought approaches and solutions in the context of broader development goals that combine several of the adaptation measures for the water resources sector with adaptation in other sectors, in particular, agriculture and forestry. In many cases this approach was defined by the understanding that water resources are affecting both the structure and performance of a national economy and a country's ability to eradicate poverty.

This is exemplified by the USD 1 million adaptation project proposed by Malawi. The project aims at reducing siltation of the biggest river in the country to enhance hydropower, to ensure quality and quantity of water supply, and to control soil erosion and deforestation. Another proposal is for a USD 840,000 project to upgrade the flood forecasting and warning system for the same river.

Another example is provided by Kazakhstan, which assessed the total investment needed for measures to increase availability of water resources in the basins of its three main rivers, and to better adapt to climate change, at about USD 10 billion. The measures include run-off regulation and diversion, water saving and increased use of underground water.

3. Agriculture

114. For many developing countries, agriculture is the most important sector of the economy. This is not only because of its contribution to the national economy in terms of GDP (which varies from less than 1 per cent in Micronesia to more than 50 per cent in the Lao People's Democratic Republic), but also because of its importance for employment (e.g. agriculture accounts for about 50 per cent of the labor force in Indonesia), food security and agro-based industry and rural development, and for the livelihood of the majority of the population, including in the large developing countries such as Brazil, China and India.

115. In the majority of developing countries, agriculture is a sector highly dependent on and sensitive to climate. Climate change and its negative impacts on food production, food security and agricultural employment will add to the stress on agricultural resources, which originates from the pressure from population growth and other socio-economic and environmental pressures. In the longer term, it will exacerbate further several factors that represent a major concern for sustainable agriculture in many developing countries, such as land degradation, increased droughts and desertification. In the short term, projected increases in the frequency and severity of extreme weather events, which are also linked to climate change, will have an even greater impact on agriculture and related food security in the developing countries than gradual changes in climate in many developing countries (FAO, 2002).

116. Many developing countries considered the adaptation measures in agriculture in a broader social and economic context by taking into account changing social and technological conditions, population pressures, environmental degradation, soil erosion, deforestation, and increasing poverty in rural areas. For the successful implementation of these measures, consistency with overarching policy objectives for poverty alleviation, food security and sustainable development was deemed critical.

117. Adaptation measures in agriculture reported by developing countries included:

- (a) Changing agronomy of crops, including switching to other cultivated varieties or crops that are more drought and salt resistant, changing sowing date and cropping pattern and introducing shorter rotations;
- (b) Improving and conserving soils, including by returning farmland to pasture and woods and technical measures to reduce soil erosion;
- (c) Improving irrigation area, methods and efficiency, such as through drip irrigation, lining irrigation canals and using closed (pipe) systems;

- (d) Promoting water and soil conserving techniques and practices, such as zero tillage and surface seeding, through education and outreach activities;
- (e) Promoting biogas to achieve multiple benefits, such as using biogas as fuel for cooking and lighting and hence reducing the harvest and use of fuelwood and associated soil erosion;
- (f) Supporting agricultural research and transfer of technology in areas such as irrigation, use of fertilizers, hydroponic agriculture, and food diversification, for example, developing food technology for non-rice food alternatives to reduce pressure on land and water resources, as noted by Indonesia;
- (g) Developing or introducing crops that are resilient to heat, drought and pests;
- (h) Improving service, market and infrastructure for agriculture enterprises and products;
- (i) Developing early warning systems for disaster preparedness and introducing crop insurance;
- (j) Improving pest and disease forecast, monitoring and control; integrated pest control also leads to more sustainable land use;
- (k) Expanding the use of organic compost and technology to use microbes to enrich soil and plant nutrients (this also reduces CH₄ emissions).

118. Many measures described above can not only address vulnerability in agriculture but also have co-benefits in other areas and sectors that are vulnerable to climate change. Water and soil conserving technology and practice, such as zero tillage, terracing and contouring, and planting vegetation as windbreaks, will protect fields from water and wind erosion and help to retain moisture. They can reduce dependence on irrigation, reduce water consumption without affecting crop yields, and allow for better resilience to the changing climate.

119. Practically all the measures enumerated above are linked to some changes in agricultural methods and practices, which is more related to human, infrastructure and institutional capacity-building and increased funding than to investment needs. Yet, with a few exceptions, addressing these areas of needs for adaptation in agriculture will also require new investments.

120. Two examples provide an assessment of the order of magnitude of investments needs for adaptation measures in agriculture. Azerbaijan estimated the cost for desalination of 218,000 ha of irrigated land at USD 545 million. Kazakhstan estimated the overall cost of adaptation measures in agriculture, including improvement of less productive land, reduction of soil erosion and providing farmers with forecasts of agricultural pests and diseases, at USD 1 billion.

4. Coastal zones management and marine resources

121. More than half of the world population live within 100 km of the coast and that number could rise further (IPCC, 2001b). The coastal areas contain diverse and productive habitats important for human settlement, development and local subsistence. Coastal resources are vital for local communities and indigenous people. For SIDS, the coastal zone is the most available area for development activities.

122. Developing countries with sea or lake coastlines and SIDS countries are inevitably those that set priorities on measures to adapt to adverse impacts of climate change. These include measures to address sea-level rise, salination of farmland due to saltwater intrusion, higher water temperature and more

stormy weather, and to deal with the impact of climate change on marine resources and ecosystems. These measures fall into two broad categories:

- (a) Physical and structural measures that include:
 - (i) Ensuring protection by building or strengthening sea walls, dykes or other infrastructure to higher standards, planting and restoring mangroves, protecting coral reefs and wetlands, beach nourishment;
 - (ii) Reforming infrastructure to be adaptive to sea-level rise, increase in temperature and extreme weather. This could mean accepting some losses and changing the habits and/or farming practices of people living in coastal areas;
 - (iii) Facilitating of withdrawing and relocating communities, infrastructure and development from threatened coastal zones;
- (b) “Soft” measures and approaches, such as promoting land-use planning and control, integrated coastal zone management including research and monitoring, information dissemination, insurance, and economic incentive to prevent disasters.

123. Investment will be needed to undertake the physical and structural measures or a combination thereof. However, some of the “soft” measures enumerated above may also require investment in order to make the adaptation measures relating to infrastructure work. Investment needs can be linked with all physical and infrastructure measures and to some extent to “soft” measures.

124. Examples of the investment needs for adaptation measures in agriculture are provided by the United Republic of Tanzania and by Azerbaijan. The United Republic of Tanzania assessed the investment needs for protecting the coastal line of its capital, Dar es Salaam, at about USD 256 million, and for protecting the whole coastline of the country at USD 8.5 billion. Azerbaijan estimated the cost of adaptation measures for its Caspian Sea coastal zone at USD 1,190 million.

5. Forest and eco-systems management

125. Climate change can reduce wood and non-wood production, intensify land erosion particularly in arid or semi-arid areas, change the natural regeneration of forests, increase pest and fire hazards, destroy and fragment habitats, affect wildlife and biodiversity, and change the hydrological cycle and hence affect water resources.

126. Many developing countries have realized that loss of biodiversity and destruction of ecosystems aggravated by climate change are long-term and irreversible in many cases. In addition, there is time lag between climate change and its observable impacts on ecosystems. Therefore, long-term planning and precautionary approaches are necessary in ecosystem and forest management.

127. Given the current poor state of knowledge and high uncertainty associated with assessment of impacts and adaptation of climate change on forests and ecosystems, some developing countries pointed out that no-regret or win-win adaptation measures that promote social and economic development in addition to enhancing adaptation should be given priority. The following adaptation measures identified by many countries are aimed at conserving biodiversity, and combating soil erosion and desertification:

- (a) Promoting natural regeneration in degraded forest lands and mixed species forestry in afforestation and reforestation programmes
- (b) Increasing support to afforestation and reforestation, and promoting agroforestry

- (c) Promoting in-situ and ex-situ conservation³ of plant and animal species
- (d) Adopting sustainable harvest, use and management of forests and their products
- (e) Identifying restoring, protecting, recovering and linking conservation areas
- (f) Preventing and controlling desertification, and minimizing woodland destruction
- (g) Preventing forest fires, pests and burning of crop residues.

128. Other frequently identified measures as a result of gaining new knowledge and assessment of climate change impacts include developing and growing drought-resistant trees, institution and capacity-building for forest-dependent communities and for silviculture,⁴ research including modelling, laboratory and field studies, modernizing forest-based industries and marketing forest products.

129. Some measures have cross-cutting effects, such as preservation of ecosystems of watersheds. Over-exploitation of watershed areas can severely affect water resources, agriculture and other economic activities downstream, such as irrigation and power generation. Using composite wood products based on wood wastes and/or improving energy efficiency of fuelwood combustion, such as in cooking stoves, can control waste of wood. The latter has a mitigation benefit too.

130. Investment needs could be identified in relation to the measures listed above. Investment-related components could be also identified in relation to the other measures, such as modernizing forest-based industries.

131. An example of measures in this sector is provided by Brazil, which listed in its INC actions and goals of its national forest programme, such as restoring 100,000 ha/year of forest for preservation. Although no cost estimate was reported for achieving these goals, external financial resources were solicited for, among other actions, the creation of a forest development fund with a budget of BRL 100 million/year (about USD 42 million/year). Also, in its INC, Azerbaijan reported several adaptation measures in forests aimed at increasing forest cover and productivity. The total cost was estimated at about USD 31 million.

6. Human health

132. The prevalence of many diseases depends largely on local climate. According to the IPCC, climate change and its impact on local climate can increase the incidence of vector-borne and water-borne diseases, especially in the tropics (IPCC, 2001b). Higher temperatures can worsen air and water pollution, which in turn can threaten human health. Increased water stress and deterioration of water quality can contribute to increases in water-borne diseases. In addition, more frequent and more severe extreme weather events, such as heat and cold, floods and drought, and cyclones, can directly cause loss of life and epidemics.

133. Developing countries that are more susceptible to vector-borne and water-borne diseases, such as malaria, cholera, dengue and diarrhoea, have reported in their NCs ongoing and planned measures and actions to adapt to possibly worsening health conditions relating to changing climate.

134. Measures reported fall into two broad categories:

³ In-situ conservation is the preservation of species in their natural habitats, the most appropriate way of conserving biodiversity. Ex-situ conservation is the presentation of components of biodiversity outside their natural habitats, e.g. in zoos, aquaria, botanic gardens and gene or seed banks. It can be complementary to in-situ methods as it helps avoid extinction and plays a valuable role in recovering endangered species. It maintains domesticated agriculture plants which cannot survive in nature unaided <<http://www.iucn.org/bil/exsitu.html>>.

⁴ Silviculture is the growing and cultivation of trees.

- (a) Direct adaptation measures, that include:
 - (i) Developing, improving or introducing more effective drugs, vaccines and medication to deal with increased drug resistance;
 - (ii) Promoting research on how diseases are transmitted, and immunization of populations, especially the poor;
 - (iii) Improving community access to adequate water, sanitation and basic health care.
- (b) Indirect adaptation measures include:
 - (i) Improving general hygiene and welfare of populations, and providing sufficient shelters during floods or cyclones;
 - (ii) Promoting public education on preventive methods and habits;
 - (iii) Strengthening surveillance and monitoring systems, for example by developing vector-specific regional maps to facilitate forecasting and control of epidemics.

135. The human health issue is highly complex, depending on climate and environmental factors, social conditions, level of economic development, sanitation and public health services. Developing countries noted that adaptation measures in other areas, such as water pollution control, improving drainage and sewage systems are beneficial for human health. Also, such measures as planting trees in settlement areas and roadsides as part of the broader adaptation effort can lower the surface temperature, and reduce heat stress and associated health threats. Such measures could have multiple benefits, by helping to absorb air pollutants and improve local air quality, and can contribute to emissions mitigation.

136. Defining investment needs in the area of human health based on the information reported in the NCs is the more difficult than in other sectors. In addition, although investments in adaptation in the other sectors could be expected to show some financial return given that there will be multiple benefits, in the health sector, which is mostly public, it is difficult to define such financial returns. Also, measures in this sector mainly address education and capacity-building that are not directly addressed in this report. Therefore, the health sector is the one with the most need for further information to assess the investment needs associated with adaptation measures.

D. Mitigation

137. Emphasizing the need for developed countries to take the lead in combating climate change in line with the principles of the Convention, many developing countries have identified and implemented mitigation measures and actions, and reported on them in their NCs. These measures have been **closely linked to, and in many cases constituted an integral element of, the sustainable development strategies** of developing countries or of their broader social and economic development plans. This reflected the recognition that a viable climate mitigation strategy cannot be achieved without a viable economic development strategy, and vice versa.

138. Given that the impacts of climate change will be felt largely by the poor, many mitigation measures were implemented with a dual goal of addressing climate change and alleviating poverty. A clear priority was given to measures that help to **slow down GHG emissions growth while promoting social and economic development** through comprehensive policies, integrated planning, technology and environmentally sound practices. A priority was also given to the **no-regret measures** that bring a number of economic, social and environmental benefits in addition to climate change mitigation.

1. Approach to defining mitigation measures and related investment needs

139. Similarly to adaptation, mitigation measures and the relevant investment needs are compiled by sector. The sectors used broadly correspond to the sectors defined by the IPCC (IPCC, 1996). They include **energy industry, including renewables; industry, including emissions relating to energy and industrial processes; energy use in residential, commercial and public sectors; transport; agriculture; LULUCF; and waste management**. Mitigation measures identified cover all major sources of GHG emissions and removals by sinks, according to the IPCC (IPCC, 2001 b). Also similarly to adaptation, areas of investment needs for mitigation are compiled on a qualitative basis following a bottom-up approach from individual NCs. An example of quantitative top-down estimate of the investment needs in the energy sector for developing countries for the next 30 years is provided in box 4 below. This estimate does not explicitly consider mitigation within the energy sector.

Box 4. An estimate of the investment needs of developing countries for the energy sector development between 2001 and 2030

In addressing the energy challenge in meeting the millennium development goals in the context of broader goals of economic and social development and to provide access to electricity, the United Nations refers to the IEA estimates according to which developing countries and countries with economies in transition as a group face the following cumulative investment requirements in their energy sectors (oil, natural gas, coal and electricity): USD 2.4 trillion (in 2000 year USD) in the period 2001 to 2010, USD 3.2 trillion in the period 2011 to 2020 and USD 4 trillion in the period 2021 to 2030. These amounts reflect the IEA's view that nearly 70 per cent of the increase in global primary energy demand will occur in these countries.

“USD 7.9 trillion of this amount is needed for investment to meet growth in domestic demand for energy, and the remaining USD 1.7 trillion of this total is for investment to export oil and natural gas to OECD countries. Investment in electricity supply accounts for 73 per cent of this total (USD 5.8 trillion). Under this investment scenario, IEA estimates that access to electricity is extended between 2000 and 2030 to about 2 billion people in the developing countries.”

Source: The Energy Challenge for Achieving the Millennium Development Goals, 2005 United Nations.

140. Implementation of **practically all mitigation measures requires investment in technology, equipment and infrastructure**. In this sense the summary of measures provided here is also a summary of areas of investment needs of developing countries for fulfilling their commitments under the Convention. An exception is several measures, for example in agriculture, whereby emission mitigation could be achieved through changes in agriculture practices.

141. The approach to formulation and implementation of mitigation measures is defined, together with considerations discussed in paragraphs 137 and 138, by the emission profile of the countries. The emission profile of developing countries is somewhat different from those of developed countries. Table 1 illustrates this difference with a sample of major non-Annex I Parties with the highest levels of emissions.

142. The information included there suggests that although energy is the most important source of emissions for both developed and developing countries, other sectors, such as agriculture and LULUCF are more important as sources of emissions in developing countries compared to the role of these sectors in the developed countries. This explains the importance attached to the measures in all these three sectors. This general pattern varies considerably among countries, depending on their policy priorities and emission profile.

Table 1. GHG emissions by sector in major non-Annex I Parties, per cent of total emissions

| | Energy | Industrial processes | Agriculture | Waste | LULUCF | Year |
|-------------------|--------|----------------------|-------------|-------|--------|------|
| China | 74.1 | 7.0 | 14.9 | 4.0 | -10.0 | 1994 |
| Brazil | 16.8 | 1.4 | 25.0 | 1.4 | 55.4 | 1994 |
| India | 60.5 | 8.4 | 28.0 | 1.9 | 1.2 | 1994 |
| Mexico | 61.2 | 2.2 | 7.5 | 2.1 | 27.0 | 1990 |
| Indonesia | 45.6 | 1.7 | 17.3 | 1.7 | 33.7 | 1994 |
| Iran | 77.1 | 6.1 | 7.3 | 2.0 | 7.6 | 1994 |
| South Africa | 78.3 | 8.0 | 9.3 | 4.3 | -4.9 | 1994 |
| Nigeria | 42.1 | 0.5 | 14.5 | 12.7 | 30.2 | 1994 |
| Republic of Korea | 85.9 | 6.1 | 4.5 | 3.6 | -9.1 | 1990 |
| Argentina | 48.2 | 2.5 | 43.8 | 5.6 | -12.9 | 1994 |

Source: FCCC/SBI/2005/18/Add.2.

Note: The total GHG emissions used for calculations include LULUCF for countries for which LULUCF is a net source.

2. Energy industry, including renewable energy

143. Energy is the fuel for development for all countries and all sectors of the economy. The energy industry is the major, and for some non-Annex I Parties the most important, source of GHG emissions (table 1). Many developing countries expected the importance of energy as a source of emission to increase with the increase in population and expansion of industry and related energy services. Most of these countries import large quantities of fossil fuel to meet their increasing demand for energy and the need to lift people from poverty. Mitigation in the energy sector is, therefore, seen by many countries as a way to ensure more efficient use of energy, manage energy demand and reduce reliance on imports. It is also seen as a means to help enhance energy supply security and save precious foreign exchange revenue for other more pressing development needs.

144. The energy industry has been one of the sectors targeted by a large number of measures, the majority of them aimed at promoting renewables and energy efficiency. These measures and related investment needs can be divided into several groups:

- (a) Improving fuel conversion efficiency in electricity generation: introducing combined cycle technology for electricity generation; retrofitting existing power plants; fuel switching from coal and oil to natural gas; and pipeline construction and expansion;
- (b) Promoting renewable energy: developing and constructing wind power; demonstrating off-grid connected renewable energy technologies; developing a portfolio of renewable energy sources, including solar wind, small hydropower and biomass; promoting renewable energy in rural areas; establishing dissemination centres for renewable energy; supplying hot water or producing electricity from geothermal sources; developing small or micro-hydropower to substitute fossil fuel; installing photovoltaic (PV) home systems and solar water heaters; promoting sustainable biomass utilization in rural areas;
- (c) Promoting use of biomass and waste for energy: producing energy from waste and agricultural residues, such as wood or bagasse gasification to generate power; energy production from paper sludge and solid waste; application of biogas technology; use of wood or waste-fuelled boilers to provide process heat; substituting of fuelwood with agriculture residue or waste-generated biogas;
- (d) Improving the fuel conversion efficiency in energy production other than power: promoting technology innovation and improvement in oil refineries;
- (e) Supporting and financing decentralized electricity generation particularly in rural areas;

- (f) Reducing energy losses in transmission and distribution systems, in the electricity grid, and in oil and gas facilities;
- (g) Promoting cogeneration: building or upgrading cogeneration plants, cogeneration in sugar production or in textile industry, cogeneration from biomass;
- (h) Promoting clean coal technology: coal gasification, coal bed methane utilization, smokeless and high efficiency coal bricketing technology.

145. Examples of estimates of investment needs for measures in energy industry include Ecuador's proposal to use residual gas for power generation that could reduce CO₂ emissions by 53 Gg at a cost estimated at USD 35 million and another proposal to use solar water heating in the residential sector that could reduce CO₂ emissions by 73 Gg at a cost of USD 3.9 million. Another example is provided by the Gambia, which estimated that displacing diesel generators by solar PV home systems could reduce CO₂ emissions by 130 Gg at a cost of USD 2.45 million.

3. Industry, including energy use and processes-related emissions

146. GHG emissions resulting from energy use in industry constitute the second largest source of energy-related emissions in developing countries as a whole. This, however, holds true mainly for countries with more industry historically and/or continue undergoing rapid industrialization. The share of emissions from this sector varies considerably among countries.

147. Yet, many developing countries have developed and implemented mitigation measures in this sector. Indeed, improving energy efficiency and material efficiency were among the most frequently implemented measures. They have been seen not only as measures to address climate change mitigation, but also as measures that often help to reduce production costs and minimize waste and improve output to input ratios, and thus bring economic and environmental benefits. Measures aiming at energy and material efficiency and related investment needs encompass:

- (a) Improving energy conversion efficiency of key generic equipment, such as heat boilers, motor systems, including through replacing and upgrading equipment;
- (b) Improving energy use efficiency in various production facilities (such as brick-making, and metals and coke production) through process optimization and upgrading;
- (c) Promoting fuel switching from biomass and firewood to LPG or natural gas in many industrial production processes, such as productions of bricks, tiles, salt and lime, and introducing associated technology changes;
- (d) Reducing energy use through material substitution: partial substitution of clinker by fly ash from thermal plants or other alternatives and substituting of wood with other non-metal construction materials;
- (e) Promoting heat recovery from different industrial processes for recycling and re-use, for example in drying, and providing support for energy auditing in industry.

148. Emissions relating to industrial processes are referred to as by-products of the processes, not as a result of energy use. This emission source is rather insignificant for most developing countries except those undergoing rapid industrialization. The measures to address process emissions focused on non-metal material production, such as technical upgrading in cement, lime and phosphate production, and modification of wet-type cement production to dry-type. Some countries also identified measures aimed to stimulate technology innovation in the aluminium industry that can reduce emissions of fluorinated gases and reduce energy consumption.

149. An example for this sector is provided by Egypt, which assessed the social and economic impacts of the mitigation options on energy efficiency including waste heat recovery in various industries. The emission reduction was estimated to be about 72 Mt CO₂ with investment of USD 926 million.

4. Energy use in residential, commercial and public sectors

150. The share of emissions from energy use in residential, commercial and public sectors, also referred to as sector others, in developing countries is smaller than that of emissions from the energy industry and energy use in the industry. This is largely due to the lower energy consumption level, which in turn is defined by the lower living standard prevailing in most developing countries. With growth in living standards, for example in China, the emissions from this sector are expected to grow fast.

151. Mitigation measures in sector others mainly relating to energy saving and in many developing countries were associated with other policy goals for sustainable development, such as improved sanitation, health and housing conditions, better public service and overall better quality of life. Most frequently implemented or planned measures and related investment needs, include:

- (a) Improving efficiency of cooking stoves, disseminating eco-stoves and introducing solar cookers in household and service sector to reduce the use of fuelwood, particularly planned by African countries and several countries in Asia;
- (b) Promoting the use of more efficient household appliances through pricing, standardization and labelling;
- (c) Enhancing efficiency in lighting by introducing and producing compact fluorescent lamps (CFL) to replace incandescent lighting or other types of lighting;
- (d) Enhancing efficiency in the building sector: adopting and implementing energy efficiency building code; promote energy saving in government buildings, invest in building insulation, introducing and using new construction technology, and utilizing indigenous building techniques and design to improve natural ventilation and air conditioning;
- (e) Promoting solar energy for water heating in the residential sector.

152. Examples of estimates of investment needs for measures in energy use in sector others include the estimates by Gambia that introduction of eco-efficient stoves could save nearly 1 Mt CO₂ at a cost of USD 2.9 million. Ecuador estimated that the substitution of existing lighting by CFL could reduce emissions by up to 680 Gg CO₂ at a cost of USD 27 million. Cameroon estimated that use of more efficient household appliances would reduce emissions by 430 Gg CO₂ at a cost of about USD 1.8 million.

5. Transport

153. The contribution of transport emissions to the overall emissions profile of developing countries is small compared to that of developed countries. However, emissions from the transport sector in many countries with booming economies have been growing fast in recent years. The growth of transport and related emissions has been a major cause of concern in these countries, primarily because of problems of urban air pollution, congestion, health and deteriorating quality of life. Solutions for mitigation of emissions from transport were seen in the context of the broader goal to promote sustainable transport and related changes in infrastructure.

154. The mitigation measures in transport often addressed several problems relating to promoting sustainable transport and also helped to slow down the growth of demand for oil products, predominantly imported ones. The measures that are most frequently addressed and related investment needs include:

- (a) Improving fuel efficiency of vehicles: reinforcing technical inspection and maintenance to reduce vehicle energy consumption; enhancing training; setting up diagnostic centres for engines; promoting smaller cars through tax differentiation or other incentives; limiting import of used cars; phasing out old vehicles; and retrofitting two-stroke engines;
- (b) Introducing and promoting the use of alternative energy: using electricity or LPG to power trams and train; converting taxis or buses to LPG; promoting fuel switching to low-carbon fuels such as natural gas, LPG, biofuel or hydrogen; producing hydrogen from renewable energy for fuel cell buses and cars; and promoting the use of gasohol (mixture of ethanol and gasoline);
- (c) Developing sustainable mass transport systems: integrating bus–rail operation by network planning; promoting more environmentally friendly modes such as public transport and cycling; and removing barriers to improving energy efficiency in the urban transport system;
- (d) Improving transport planning and control: using information systems for speed and traffic management; adopting appropriate road pricing; and implementing integrated transport systems in metropolitan areas;
- (e) Optimizing transport infrastructure: redesigning the road system and rehabilitating existing roads; improving urban and inter-urban road networks; enhancing railway networks and reopening services to reduce the use of road vehicles; and building bicycle paths.

155. Mauritania proposed a comprehensive project in the transport sector aimed at limiting the import of used vehicles, reinforcing technical inspection and encouraging the use of public transport. This project could reduce emissions by 11 Mt CO₂ at a cost of USD 54 million. Kenya proposed a traffic flow improvement project for Nairobi and a project to remove barriers to improving energy efficiency in urban transport systems, which could reduce emissions at a cost, for the two projects, of about USD 1.4 million.

6. Agriculture

156. For many developing countries, agriculture is not the largest source of GHG emissions, although it makes a considerable contribution to total GHG emissions compared with developed countries. Nonetheless, mitigation measures in agriculture are often considered, as they are often seen as “no-regret” measures due to their other benefits. In addition, as noted in the adaptation section, agriculture is the sector with a high potential for integration of climate related measures with sustainable development, in addition to integration of adaptation and mitigation. Frequently identified mitigation measures and related investment needs include:

- (a) Increasing carbon storage in agricultural soil through avoiding burning crop residues, preserving farming soil, reducing savannah burning, promoting sustainable agriculture, using soil-conservative tillage techniques to sequester carbon in soil, and rehabilitating over-grazed land;
- (b) Adopting manure management techniques for CH₄ collection and combining with biogas production as fuel to expand energy service in rural area;

- (c) Improving the efficiency of the use of nitrogen fertilizer by adopting appropriate application practices.

157. Many measures and projects proposed by developing countries were aimed primarily at mitigating CH₄ emissions from livestock and rice production. These emissions are often referred to by developing countries as survival emissions, as they are unavoidable and necessary for meeting basic needs. Measures targeting these emissions, which have a substantive investment component, include:

- (a) Improving management of ruminant animals through livestock diet improvement, grazing land management, reduced enteric fermentation by genetic and biotechnology, treatment of forages to improve digestibility, improved nutrition, and supplementation of fodders;
- (b) Improving rice production practices, introducing new technologies, improving water and fertilizer management of rice cultivation, using and managing rice crop waste.

7. Land use, land-use change and forestry

158. The LULUCF sector is the second major source of emissions for developing countries as a whole. For some countries, particularly in Latin American and Africa, and a few in Asia with a large forest sector, LULUCF is the largest source of GHG emissions mainly due to deforestation. Mitigation in this sector is, therefore, among the key climate responses for these countries. This explains the bulk of the prepared mitigation measures that involve major investment in LULUCF.

159. Similarly to agriculture, LULUCF is a sector with a high potential for integration of climate related measures with sustainable development in addition to integration of adaptation and mitigation. The mitigation measures in the LULUCF sector and related investment needs include:

- (a) Promoting forest conservation and restoration, afforestation and reforestation;
- (b) Improving forest management practices and promoting sustainable forest development: changing to more adaptive cultivated varieties, growing protective forest in watersheds, improving timber harvest techniques;
- (c) Encouraging conservation and substitution of fuelwood: setting up and managing fuelwood forests; replacing fuelwood in residential use with LPG or solar energy; recycling and more efficiently using wood products; promoting efficient charcoal kilns and charcoal making techniques;
- (d) Promoting and developing agroforestry: establishing agroforestry systems or plantations, and growing and maintaining green belts around cities.

160. An example of investment needs for measures in the LULUCF sector is provided by Madagascar, which estimated that it would need about USD 6.4 million for forest conservation and restoration, afforestation and reforestation.

8. Waste management

161. The GHG emissions from waste account for a small portion of total emissions from developing countries. However, with population growth and increasing urbanization in many countries, mounting waste problems are increasing pressure on local environment and air quality in addition to increasing GHG emissions. Discharge of unprocessed waste water is threatening water resources and affecting the availability of drinking water. Mitigation measures in the waste sector can, therefore, generate major co-benefits in the local environment, health and safety.

162. GHG emissions from the waste sector originate from two sources: handling, treatment and management of waste water (mainly sewage and municipal waste water) and solid waste. Mitigation measures dealing with waste-water management include recycling and treatment of municipal waste water, and recovering methane from waste-water treatment as biogas.

163. However, the primary focus of mitigation measures by most developing countries is on solid waste management. These measures and related investment needs include:

- (a) Reducing waste generation at source through introducing eco-design of products and providing related training materials;
- (b) Promoting integrated waste management throughout the entire chain from waste collection and transport to final disposal;
- (c) Promoting waste recycling, setting up collecting facilities and recycling plants;
- (d) Promoting composting to produce biogas as an energy supply, particularly to rural areas, which can reduce GHG emissions from waste burning as well as desertification caused by demand for fuelwood;

164. An example of investment needs for mitigation in the waste sector is provided by Ghana, which proposed a project as described in paragraph 163 (d) and estimated that the project could reduce emissions by 553 kt CO₂ equivalent at a cost of about USD 1.8 million.

V. Experience of international funds and multilateral financial institutions relevant to climate change mitigation in developing countries

A. Sources of data and limitations

165. Information in this chapter was compiled primarily from web sites and annual and other reports. Much of the information was provided by the financial institutions themselves. In addition, some aggregated data were available through intergovernmental sources (OECD, World Bank) and trade journals (*Environmental Finance*, *Project Finance*). The exact sources of data used are described in detail in annex II, but in general terms, they included the following:

- (a) Multilateral sources (MDBs): institutions' web sites and annual and other reports, as well as OECD and World Bank databases
- (b) Bilateral sources (ODA and ECA): NCs submitted by Annex I Parties, OECD databases and reports on ODA and ECA activities, and ODA and ECA web sites and reports
- (c) Private infrastructure investors: World Bank databases and reports, other multilateral sources (such as UNEP, the International Energy Agency and UNCTAD) and industry trade journals (such as *Environmental Finance* and *Project Finance*).

166. This chapter provides a comprehensive overview of the major external sources of investment relevant to climate change mitigation in developing countries, but it does not give detailed information of any particular source, institution, project or programme. As a rule, the vast majority of the investments were made to help countries develop and not exclusively for climate change mitigation. Without going deeper in each institution and activity (an effort that would go beyond the scope of this report), it would be difficult to ascertain the magnitude of the investments targeting climate mitigation.

167. One of the key findings of the compilation of information is that substantial gaps and inconsistencies exist in the available data. A wide variety of reporting scopes, periods, methods and

motivations were encountered. Efforts were made to collect and analyse as much data as possible and to present them in a consistent way. United States dollars were used as the common currency in which to express the results, **adjusted to 2002 USD for time series data**.⁵

B. Approach

168. The section of this report on mitigation covers investments in the form of **grants, loans and equity investments**, particularly where they are provided to projects or activities that lead directly to, or increase the commercial demand for, reductions in GHG emissions in developing countries; or for which the primary purpose is to create the conditions for attracting such investments (see annex I for definitions of investments). Only investments relating to **infrastructure, technology and equipment** are covered in the report; other investments, such as investments in education, capacity-building and enabling activities relating to climate change, are not covered. Given the data that are available, this means that much of the compilation of information covers investments in basic infrastructure projects in the energy and transport sectors, and to a lesser extent investment in other sectors.

169. Two major types of investment for mitigation are considered in this paper. The first type includes **“core mitigation investments”** in the relevant sectors, which are investments self-defined by the source of investment as being made for emission mitigation purposes, as well as investments made in sectors or projects that by their very nature are likely to reduce emissions (such as renewable energy).

170. The second type of mitigation investment includes a broader category of **“climate relevant investments”** in the relevant sectors which are investments in sectors with substantial emission impacts, whether they be positive or negative. For example, many investments in industry may reduce GHG emissions by replacing existing production methods with cleaner and more efficient technologies. Construction of a new production facility, however, could increase net GHG emissions if the new plant represents an addition, rather than an upgrade, to the industrial capacity of a given country. Comparing the two types of mitigation investment underlines the potential for changes of climate relevant investment into core mitigation investments, and therefore, for reduction in further emissions.

171. To the extent that the available data allow (see analysis below), the information is compiled and analysed according to the following **sectors and activities**:

- Energy supply (conventional and renewable)
- Energy demand (in the residential, institutional and agricultural sectors)
- Transport (particularly rail and water passenger and freight transport)
- Industry (energy and material efficiency in industrial processes)
- Forestry
- Waste management (landfill management, recycling, composting, and incineration).

172. **Only investments in countries not included in Annex I to the Convention** are considered in this paper. By focusing exclusively on non-Annex I countries, a substantial amount of mitigation investment in Central and Eastern Europe and the Russian Federation is not included in this compilation.⁶ For purposes of the analysis, developing countries are grouped into the following regions:

⁵ Currency values and inflation adjustment factors were obtained from the United States Federal Reserve Bank <www.federalreserve.gov> and the United States Bureau of Labor Statistics <www.bls.gov/cpi/>, respectively.

⁶ For example, about 90 per cent of the climate relevant investment involving private participation in the Eastern Europe and Central Asian region between 1994 and 2003 went to Annex I Parties with economies in transition, and only 10 per cent went to the non-Annex I Parties in Eastern Europe and Central Asia. (World Bank, *Private Participation in Infrastructure Database*, <<http://ppi.worldbank.org>> (accessed 17 July 2005)).

- Africa and the Middle East
- Asia (including East Asia and South Asia) and the Pacific
- Latin America and the Caribbean, including the SIDS
- Non-Annex I Parties Europe, referred to hereinafter as Eastern Europe, and Central Asia (including Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Georgia, Kazakhstan, Kyrgyzstan, Republic of Moldova, Serbia and Montenegro, Tajikistan, The former Yugoslav Republic of Macedonia, Turkmenistan and Uzbekistan).

C. Multilateral development bank and fund investment in projects and activities relating to mitigation

173. With the international community becoming increasingly aware of the impacts of climate change, the MDBs, such as the World Bank, AfDB, ADB and 15 others (for a full list, see annex II), have responded by increasing their attention to mitigation and mitigation-related projects and activities throughout the past decade and a half. Few of these occur in the context of the banks' specialized lending programmes and policies relevant to climate change mitigation, see box 5. Importantly, the World Bank has identified essential linkages between the effects of climate change and the ability of the weakest economies to combat poverty.

1. Data sources and limitations for compilation of MDB investments

174. Data on mitigation investments by MDBs mainly came from two groups of sources. The first group comprises the MDBs' web sites and annual reports. The second group comprises the World Bank's Private Participation in Infrastructure (PPI) database (see paragraph 226) and the OECD's Creditor Reporting System (CRS), known as the OECD/CRS database. These two databases provided alternative methods to estimate the core mitigation and climate relevant investments of the MDBs and also provided an opportunity to cross-check the results obtained from the first group of sources.

175. The inconsistencies and gaps in the MDB data collected over the 10-year period suggest that most of the estimates in this report tend to understate the total investment by MDBs. The major inconsistencies and data gaps include:

- Annual reports: data gaps are linked to the inconsistencies in reporting, both between and within MDBs, and the limited availability of annual reports prepared prior to 2003;
- PPI database: this data set does not cover all mitigation projects funded by MDBs, particularly given its focus on the electricity, rail and port sectors;
- OECD/CRS database: the data set covers only projects funded by the largest banks.

Box 5. Specialized lending programmes of MDBs

Certain MDBs have developed specialized lending programmes and policies to specifically address climate change and for climate relevant investment in projects that reduce emissions, such as energy efficiency and renewables. EBRD sets priority on energy efficiency and renewable energy, and employs a strategy specific to energy efficiency to make available funding for projects that guarantee large energy savings. The EIB has increasingly supported renewable energy projects. The World Bank has actively promoted both energy efficiency and renewable energy within the broader context of priority energy accessibility, affordability and environmental sustainability. The ADB is implementing the Asia Least-cost Greenhouse Gas Abatement Strategy (ALGAS), which is funded by the GEF through the United Nations Development Programme, one of GEF's implementing agencies. This strategy aims at providing technical assistance to 12 Asian nations in their efforts to meet their commitments to the UNFCCC.

In addition, several banks have enthusiastically promoted carbon funds. These include: the World Bank (Prototype Carbon Fund), EBRD (Netherlands EBRD Carbon Fund), and the Andean Development Corporation (Latin American Carbon Program).

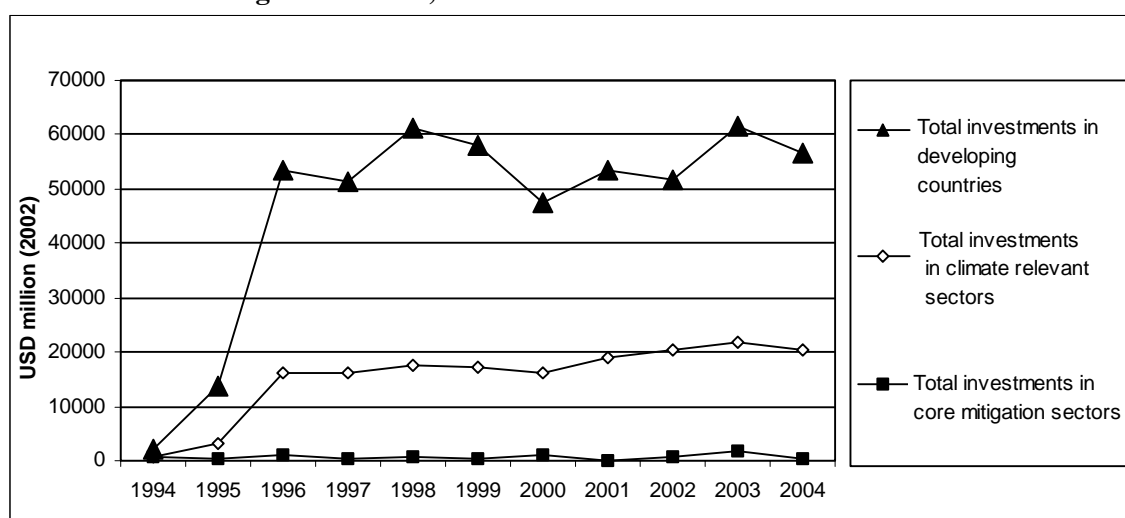
Also relating to climate change are broader environmental standards for lending projects, including procedural safeguards (e.g. the IFC Operational Policy on Environmental Assessment), technical standards (e.g. the World Bank Pollution Prevention and Abatement Handbook), and exclusion lists restricting investment in certain activities (e.g. the EBRD exclusion list on environmentally related activities, products and substances, including ozone depleting substances).

However, outside the GEF, the MDBs do not have a mandate to explicitly focus on projects and activities relating to climate change that may generate global benefits, which restricts the projects to “no regret” and long-term strategies.

2. Multilateral development banks self-reported investments

176. Although some of the MDBs provide lists of climate mitigation projects, which form the **MDBs core mitigation investments** in their annual reports, this is more the exception than the rule (the list of annual reports is given in the bibliography) As such, the levels of self-reported investment in the core mitigation sectors are relatively low and the analysis at this level tends to underestimate MDB funding towards climate change mitigation (figure 1). Yet, these data serve to define the lower bound of the range of mitigation investment by MDBs.

Figure 1. MDB total investments in developing countries, self-reported investments in core mitigation sectors, and investments in climate relevant sectors



Source: Annual reports of MDBs from 1994 to 2004, as listed in the bibliography.

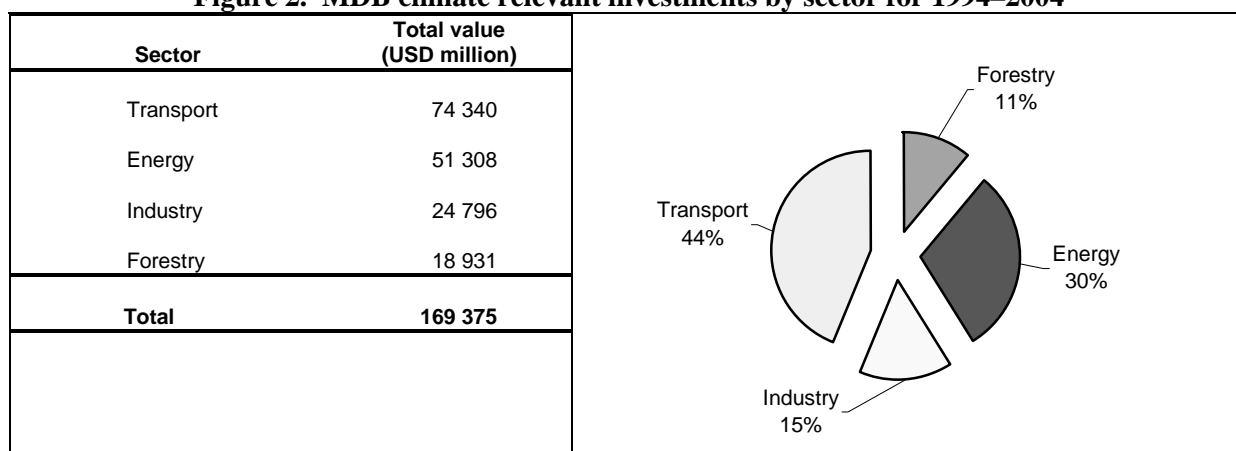
177. The analysis of data suggests some increase in investments in core mitigation sectors over the period 1994–2004, which could be explained by the increased attention given to climate change mitigation since the entry into force of the Convention. It could be also explained by the increasing availability of annual reports as a sources of data. The differences in annual investment estimates are quite considerable. As the total level of investments reported is relatively low, these differences are most likely explained by a few large projects that skew the results for a particular year.

178. Similarly to core mitigation investments, self-reported **MDB investments in climate relevant sectors** between 1994 and 2004 increased as well (figure 1). As a likely overestimate of the investment in mitigation, these totals serve as a useful upper bound on the possible range of these investments. As with the core mitigation investments, the increasing number of annual reports available over time might skew the results.

179. Figure 2 shows climate relevant investments by sector for the period between 1994 and 2004. Some of these percentages might be inaccurate, because the sectors used by the MDBs in their reporting are often not as specific as the sectors used for this analysis and hence a judgement had to be made on the

distribution of aggregated amounts among sectors. The distribution by sector suggests, that investment in energy and transport dominate the overall investment pattern on mitigation projects.

Figure 2. MDB climate relevant investments by sector for 1994–2004

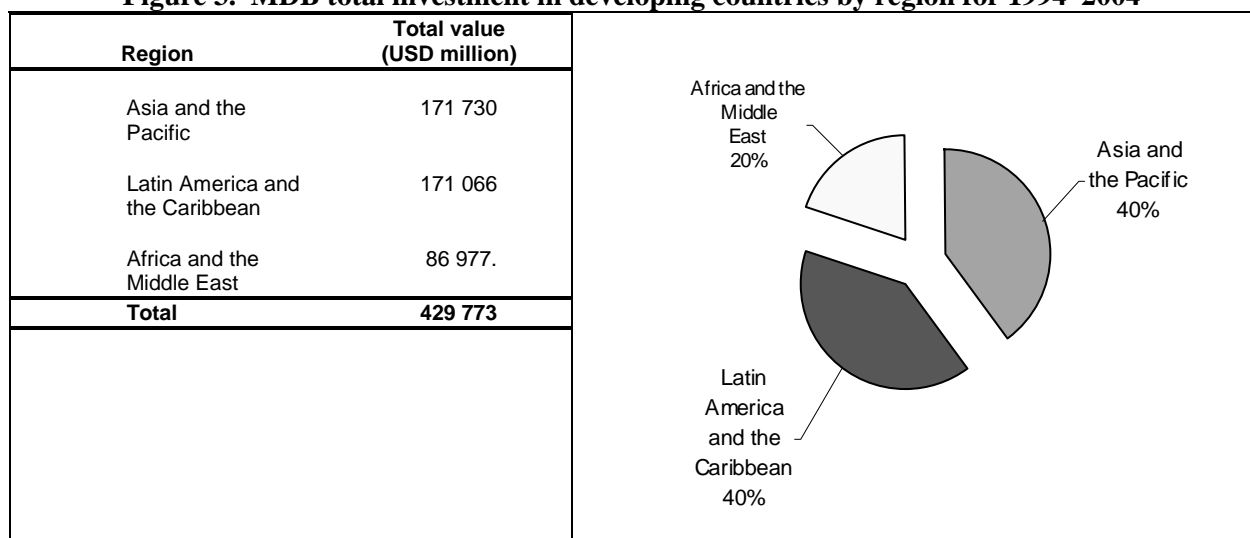


Source: Annual reports of MDBs from 1994 to 2004, as listed in the bibliography.

180. **MDB total investment in developing countries** are shown in figure 1 together with the core mitigation investments and investments in climate relevant sectors self-reported by the MDBs. The data suggest that the levels of core mitigation investment compared to climate relevant investment are very small. In 2003, the year with the most complete data, self-reported core mitigation investments accounted for only 3 per cent of total annual investments by MDBs. Self-reported investment in climate relevant sectors were much more substantial that year and accounted for 35.6 per cent of total MDB investments. The low level of core mitigation investments might simply be due to the lack of comprehensive reporting in this area. Also, the exclusion of GEF-funded projects and projects in EIT countries also contributed to this low level.

181. A breakdown of the total investments for developing countries by region is shown in figure 3. It highlights that between 1994 and 2004, the Africa and the Middle East region received about half the funding that both Latin America, and Asia and the Pacific obtained from the MDBs. The pattern of investments in climate relevant sectors broadly replicates the total investment pattern.

Figure 3. MDB total investment in developing countries by region for 1994–2004^a



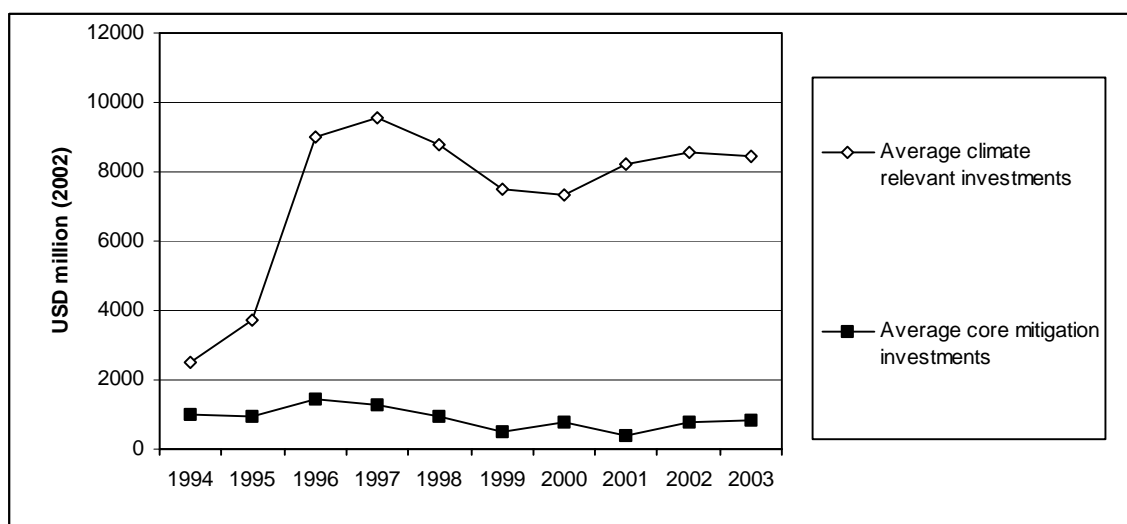
Source: Annual reports of MDBs from 1994 to 2004, as listed in the bibliography.

^a Methods of reporting total investments to developing countries make it difficult to separate Eastern Europe and Central Asia. For the purposes of this graph, this region is included in Asia and the Pacific.

3. MDB investments, including investment data from the PPI and OECD/CRS databases

182. Because of the gaps in data on self-reported core mitigation investment and climate relevant investments readily available from the MDB annual reports and web sites, the PPI and OECD/CRS databases were used, in addition, to develop a composite balanced estimate of core mitigation and climate relevant investment over the period 1994–2003 based on the average of each of the three data sets. The averages for core mitigation investments and for climate relevant investments are shown in figure 4, and they are further used in the analysis across investment sources at the end of this section.

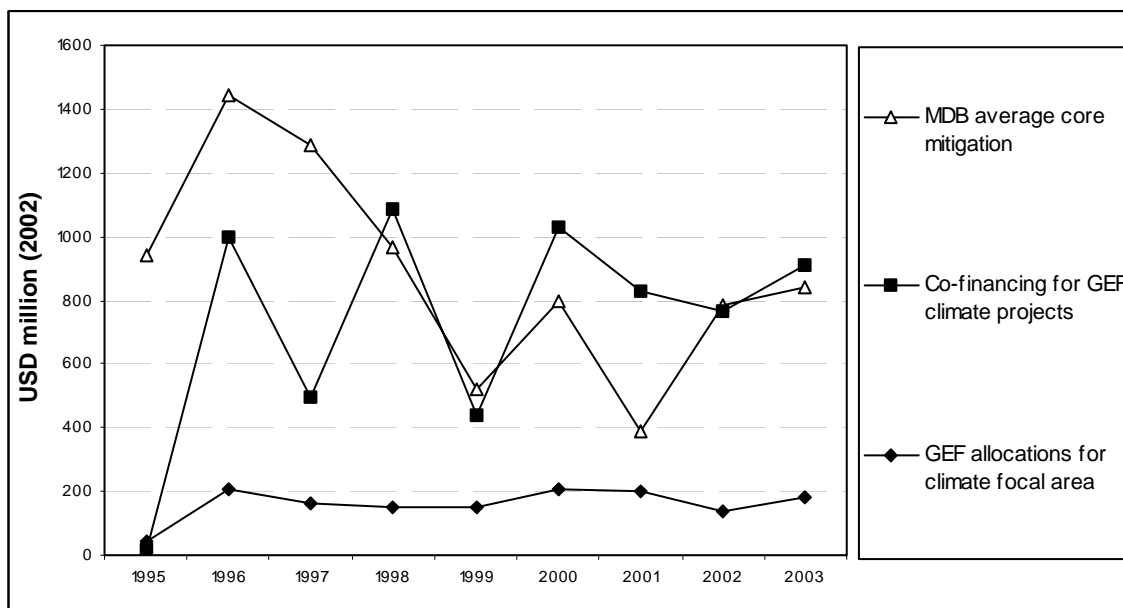
Figure 4. Average core mitigation investment and average climate relevant investment by MDBs for 1994–2003



Sources: Annual reports of MDBs from 1994 to 2004, as listed in the bibliography; World Bank PPI Database; OECD CRS Database.

183. Because many GEF projects are co-funded with resources from the MDBs, it is useful to compare the average MDB core mitigation investment to that provided by the GEF as shown in figure 5.

Figure 5. Average MDB core mitigation investment compared with GEF funding for the climate focal area for 1994–2004



Sources: FCCC/SBI/2004/6; Annual reports of MDBs from 1994 to 2004, as listed in the bibliography; World Bank PPI and OECD/CRS databases.

184. Overall GEF allocations for its climate focal area between 1992 and 2004 amounting to USD 1.81 billion⁷ are much smaller than the MDB core mitigation investments amounting to around USD 8 billion for the same period. Together with the co-financing leveraged by the GEF projects, however, the GEF investments amounted to more than USD 11 billion and are comparable in scale to the MDB core mitigation investments. If climate relevant investment are taken into account, the MDB role in the area of mitigation becomes more prominent. This suggests that the MDBs role in meeting the investment needs of developing countries' on mitigation could be at least equally important as the role of the GEF.

4. Lessons learned about MDB investments

185. **On the lessons learned by the MDBs**, the World Bank has published a large amount of information relating to its experiences in investing in environmental projects, and in particular in climate change mitigation projects. For example, a 2000 report entitled *Fuel for Thought: An Environmental Strategy for the Energy Sector* lists three main lessons in regards to energy and the environment. The first lesson is that more time than initially estimated is needed to achieve results on environmental and social issues. The second is that commitment on the part of the borrower to stay the course and to achieve real change is critical. And the third is that although there is strong engagement in the reform agenda, the strength of the World Bank Energy Groups' commitment to energy efficiency and the environment has to be enhanced.⁸

⁷ The two numbers are not strictly comparable as the GEF funding also includes funding for enabling activities and funding for projects that bring global environmental benefits in EIT countries (FCCC/SBI/2004/18).

⁸ World Bank. *Fuel For Thought: An Environmental Strategy for the Energy Sector* (Washington DC: World Bank, 2000): <http://www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2000/09/01/000094946_0008040539585/Rendered/PDF/multi_page.pdf>.

186. Building upon these experiences, the World Bank also published lessons learned specific to climate change in its *Environmental Strategy from the World Bank* report for 2001. This report states that “Policy reforms are essential for mobilizing private capital for efficient energy development, for creating a level playing field to foster competition, and for promoting alternative approaches to energy service delivery, including incentives for service providers to diversify and innovate and to enable clean technologies and fuels to compete on equal terms, and many cost-effective options for reducing GHG emissions in developing countries also have substantial economic and local environmental benefits.”⁹

187. **On the lessons learned from the compilation exercise**, it is important to note that the results presented in this report on MDB activities relating to climate change mitigation are only preliminary conservative estimates because of the limited amount of readily available data, the inconsistencies in reporting practices across MDBs, and the difficulties that these inconsistencies pose for efforts to compare investment flows across MDBs over time and with other investors.

188. Although preliminary, the data gathered provide a possible range for mitigation investment by the MDBs. In particular, the huge range between the core mitigation investments and the investment in climate relevant sectors suggests substantial implications in terms of climate change mitigation in much of the MDB activities. These implications could be even greater given that the MBD investments usually help to attract additional private investments. This offers the MDBs the opportunity to give greater consideration to the relationships among all their projects in climate relevant sectors to climate change, even if they are not designated as “climate” projects per se.

189. In general, the MDBs with the highest levels of self-reported investments in core mitigation sectors were those with the most accessible and standardized reporting methods, either within their annual reports, on their web sites, or in separate energy or environment reports. Some good examples are provided in box 6 below. Other banks provided statements of their core mitigation investments, but their reporting methods did not disaggregate the data to a level that could be used for this compilation.

Box 6. MDBs with the highest share of investment in mitigation and their recent relevant reports

The World Bank, EBRD, IADB and ADB are the banks with the highest shares of self-reported mitigation investments within their portfolios.

The World Bank’s paper published in March 2005, titled *The World Bank Group Progress on Renewable Energy and Energy Efficiency: 1990–2004*, presents data on these projects by country, energy type, and funding source (GEF, IBRD/IDA, IFC, MIGA). EBRD produced two comprehensive reports: *EBRD Statement of Cumulative Net Commitments: Energy Efficiency 1991–2000* and *EBRD Investments: Statement of Cumulative Commitments 1991–2004*. Through a document titled *Annual Report on the Environment and Natural Resources 2002*, the IADB highlighted its investments directed towards sustainable energy projects. In addition, the ADB provided large amounts of information on investments in energy projects through annual reports and its web site.

190. The experience of compilation of information on MDB investments suggests a possibility for future longer-term research delving deeper into the area of MDB involvement in investing in climate change mitigation and the acquisition of more comprehensive data from each of them (that may go beyond publicly available information). This experience also suggests that without a uniform reporting format, compilation and analysis of data across MDBs will remain extremely difficult.

⁹ World Bank, *Environment Strategy for the World Bank* (Washington DC: World Bank, 2001): <[http://lnweb18.worldbank.org/ESSD/envext.nsf/41ByDocName/AnnexF-ClimateChange171KB/\\$FILE/EnvStrategyAnnexF2001.pdf](http://lnweb18.worldbank.org/ESSD/envext.nsf/41ByDocName/AnnexF-ClimateChange171KB/$FILE/EnvStrategyAnnexF2001.pdf)>.

D. Investment provided on a bilateral basis through the official development assistance and export credit agencies

191. In addition to investment from public multilateral sources, individual countries, particularly those that are members of the OECD, also make considerable investments in developing countries relating to climate change mitigation. These investments provided on a bilateral basis include two major sources: ODA agencies and ECAs. The mitigation investments made by each of these types of investor are described in the next two sections.

1. Official development assistance agencies

192. Among the many projects supported by ODA funds, several may reduce GHG emissions by promoting cleaner and more efficient technologies or by protecting natural carbon sinks. The largest providers of ODA to climate mitigation projects include Japan (JICA, JBIC), Germany (BMZ, KfW, GTZ), the United States (USAID) and the United Kingdom (DfID) (for the list of the ODA agencies surveyed see annex II). The following section examines ODA commitments with the purpose or effect of mitigating climate change across a variety of climate relevant sectors.

Data sources and limitations for compilation of ODA investment

193. Three major sources of data were used in this analysis of ODA investment. The first is the NCs submitted to the secretariat, which are considered as self-reported sources. Although the NCs varied in quality and there were several data gaps, they did improve in quality and consistency over time. Moreover, most NCs distinguished between mitigation and adaptation aid, which made them an important source of information on investment experiences.

194. The second major source includes reports and statistics from the OECD. Data on total investment in core mitigation sectors and climate relevant sectors came from the OECD/CRS database. Data on total ODA across all sectors were taken from the World Bank's *Global Development Finance* reports for 2004 and 2005, which are the third major source of information.

ODA mitigation investment by various data sources

195. According to the **self-reported data on ODA core mitigation investments**, the wealthiest nations, the G8 nations¹⁰ (excluding the Russian Federation), accounted for more than 87 per cent of all self-reported mitigation aid between 1994 and 2000. Japan, the largest ODA investor in climate mitigation projects, committed JPY 580 billion (about USD 4.9 billion (2002)) to 48 projects in 11 countries between December 1997 and March 2001.¹¹ Other industrialized countries with smaller economies also invest a large amount of money in climate related projects, but on a more limited regional basis and across fewer sectors. For example, "due to the size of the country and its limited resources, Austria focuses on several priority regions in Africa, the Himalayas and Central America" with most projects involving small-scale hydropower, solar energy, or rain forest preservation.¹²

196. It is difficult to conduct trend analysis across Annex II countries as a whole of data on core mitigation investments reported in their NCs due to the variability of the number of countries reporting for any particular year within the 1994–2000 period.

¹⁰ G8 nations are Canada, France, Germany, Italy, Japan, the Russian Federation, the United Kingdom of Great Britain and Northern Ireland, and the United States of America.

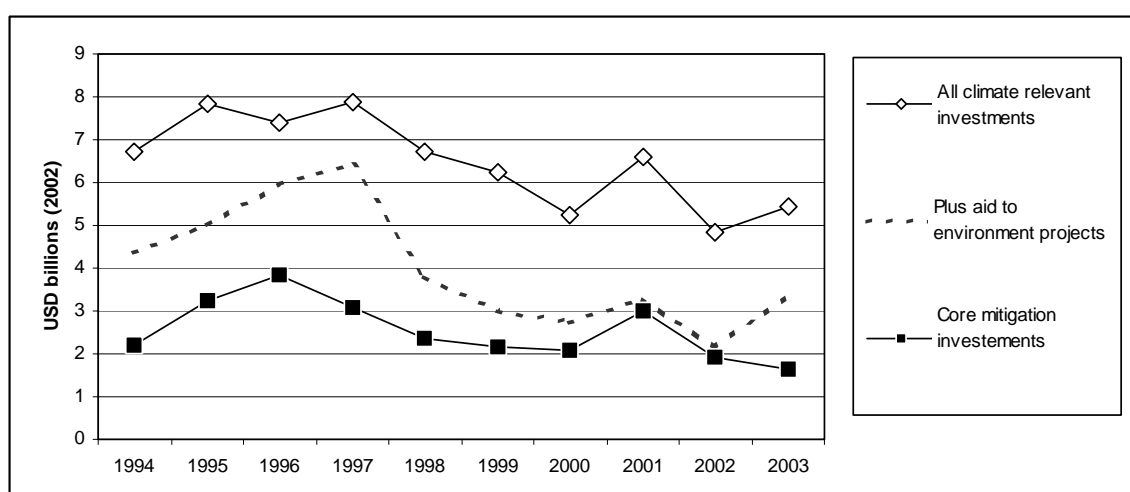
¹¹ *Japan's Third National Communication Under the United Nations Framework Convention on Climate Change*, available on the UNFCCC web site at: <<http://unfccc.int/resource/docs/natc/japnc3.pdf>>.

¹² *Third National Climate Report of the Austrian Federal Government*, available on the UNFCCC web site at: <<http://unfccc.int/resource/docs/natc/autnc3.pdf>>.

197. According to the **core mitigation investments data provided by the OECD**, as shown in figure 6, annual investment in the core mitigation sectors ranged from approximately USD 2 billion to 4 billion between 1994 and 2003. In an effort to provide as many useful estimates of climate related investment as possible, investment in the core mitigation sectors and in projects within the other climate relevant sectors that scored as principally or significantly environment-oriented using the OECD's "**aid to environment**" marker are shown in figure 6. Hence, this marker serves as a useful way to identify climate related aid within broader climate relevant sectors.

198. Whereas total investments in the core mitigation sectors were within the range of USD 2–4 billion annually, **total investment in all climate relevant sectors according to OECD data** averaged USD 5–8 billion per year according to the OECD/CRS data (figure 6).

Figure 6. Total ODA core mitigation investments in environmental projects and climate relevant investments for 1994–2003



Source: OECD/CRS database.

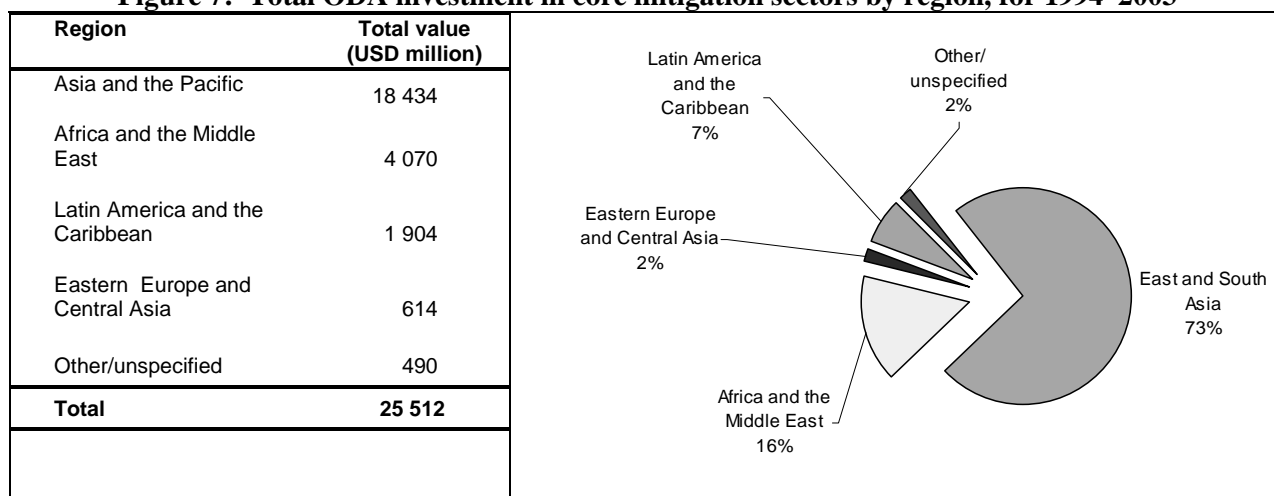
199. The regional and sectoral distributions of total investment in the core mitigation sectors, cumulative for the period from 1994 to 2003, are illustrated in figures 7 and 8. The large share of aid going to Asia and the Pacific is explained by the fact that 56.8 per cent (USD 14.5 billion) of all ODA during this period came from Japan and 89 per cent (USD 12.9 billion) of Japanese investment went to East and South Asia.

200. The sectoral split of investments shown on figure 8 underlines, similarly to that for the investments by MDB, the importance of the energy and transport sectors in mitigation investments, with almost 80 per cent of total ODA investments going into these two sectors.

201. The **total ODA investment to developing countries according to World Bank data** averaged USD 50–60 billion per year between 1994 and 2003.¹³ Hence, investment in the core mitigation sectors was 3 to 8 per cent of this total in any given year and investments in climate relevant sectors was 8 to 17 per cent. Therefore, investments with the mitigation effect represent a small, but not unsubstantial, portion of all ODA to developing countries. As with the MDBs, the actual total of climate mitigation investment probably lies somewhere between the estimated investments in core mitigation and climate relevant sectors.

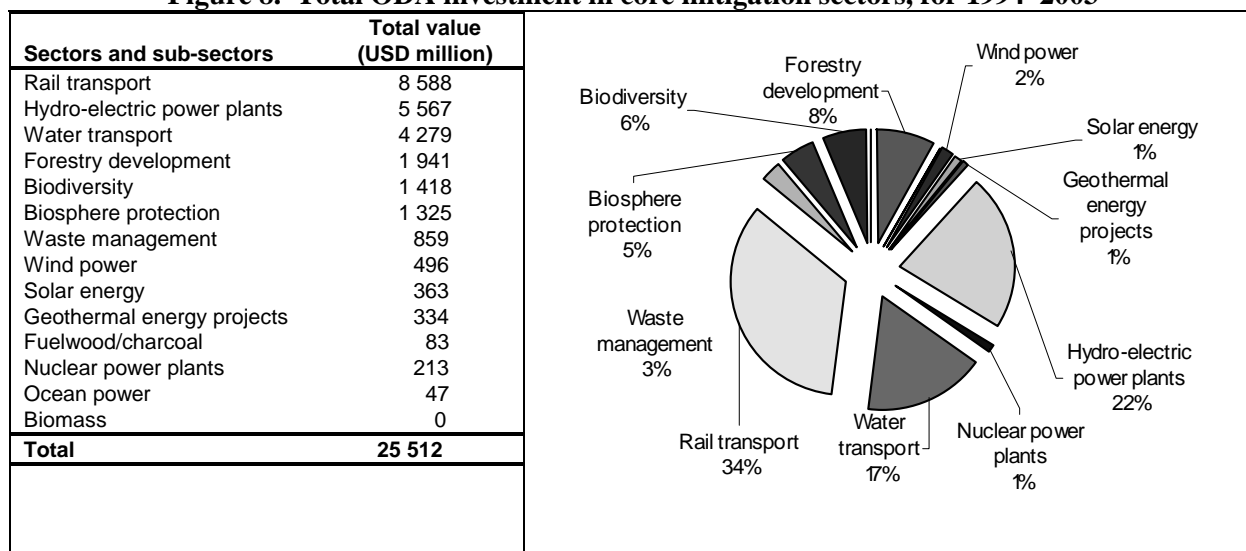
¹³ World Bank, *Global Development Finance 2005* (Washington DC, World Bank, 2005).

Figure 7: Total ODA investment in core mitigation sectors by region, for 1994–2003



Source: OCED/CRS database.

Figure 8. Total ODA investment in core mitigation sectors, for 1994–2003



Source: OCED/CRS database.

202. The pattern of the regional distribution of total net ODA investment between 1995 and 2001 is somewhat different from those of the core mitigation investments in that Africa and Middle East receive by far the largest share of about 40 per cent. One possible explanation for this is the priority attached in the overall ODA policy agenda to poverty alleviation.

Lessons learned on ODA investment in mitigation

203. **On the lessons learned by the ODA investors in mitigation**, many of these investors have sought to transfer the knowledge and experience gained from domestic projects to international aid activities. For example, Australia has invested in several power distribution projects in developing countries using its experience in bringing power to rural regions within its own borders. In addition to success stories, the European Community identified several challenges as development aid policies continue to bring more attention to climate change mitigation. This includes the need to identify better specific needs of developing countries relating to their commitments under the Convention, e.g. through

an enhanced country dialogue on climate change. This also includes the use of the ODA for mainstreaming the Convention objectives while maintaining the focus on poverty alleviation.¹⁴

204. **On the lessons learned from the compilation exercise**, the noticeable data gaps in the self-reported sphere should be noted. Although self-reported data, e.g. in the NCs of Annex II Parties, have improved in recent years, inconsistent reporting practices continue to impede attempts to aggregate data or make comparisons across countries. Problems include the absence of a standard reporting currency and a tendency to highlight only examples of mitigation activities without reporting an aggregate figure.

205. Other lessons learned include the lack of information on climate change data available from individual ODA agencies and the absence of a clear standard for classifying projects as climate relevant in general and mitigation oriented in particular. Developed countries have clearly increased their attention to the need by developing countries to meet their commitments under the Convention by including climate change objectives among their ODA priorities. However, the extent to which this has occurred remains uncertain. More transparent and thorough reporting at all levels would make it easier to understand and plan ODA support.

2. Export Credit Agencies

206. The ECAs are bilateral financial institutions that encourage the export of goods, primarily to developing countries, by providing export financing and investment insurance. Many of these goods and services are in the sectors with the greatest impacts on GHG emissions. As a result, the export credits used to finance these sectors are an important source of investment relevant to climate change mitigation in developing countries.

207. In 2003, ECAs supported trade and investment worth USD 649 billion, some 7 per cent of the USD 9.1 trillion in overall export trade.¹⁵ Within the overall financing mechanisms used by ECAs, medium-term (longer than two years) and long-term (longer than five years) export credits are the most relevant for the financing of climate relevant infrastructure projects in developing countries. The major ECAs providing such credits are those of Australia (EFIC), Canada (EDC), France (COFACE), Germany (EULER HERMES), Italy (SACE), Japan (NEXI), the Netherlands (ATRADIUS), Spain (CESCE), Sweden (EKN), the United Kingdom (ECGD) and the United States (EXIMand (for the list of the ECAs surveyed, see annex II).

Data sources and limitations for compilation of ECA investment

208. To compile data on the “self-reported” financing of climate mitigation by ECAs, their annual reports were used. Annual sustainability reports and environmental reports, where available, were also used, in particular for the “lessons learned” section.

209. The most comprehensive and readily accessible source for information about ECA financing is a publication titled *Statistics on Export Credit Activities* (up to and including 2003), issued by the OECD Export Credit Group.¹⁶ In their publicly available form,¹⁷ the OECD data have a number of limitations:

- No data are available on individual transactions, environmental impacts, or GHG emissions

¹⁴ *Third Communication from the European Community under the UN Framework Convention on Climate Change*, available on the UNFCCC web site at: <http://unfccc.int/national_reports/items/1408.php>.

¹⁵ Berne Union, *2005 Berne Union Yearbook* (London: Newsdesk Communications Ltd., 2005) <<http://www.berneunion.org.uk/Berne%20Union%20Yearbook%202005.pdf>>.

¹⁶ See footnote 15.

¹⁷ Due to agreements between the OECD and the ECAs that provide information on their annual transactions, it was not possible to access the underlying database as part of this review.

- It is difficult to disaggregate annual statistics to look simultaneously across sectors and regions
- Data on the distribution of ECA financing across sectors are available only for long-term credits
- No data are provided for the period from 1994 to 1997.

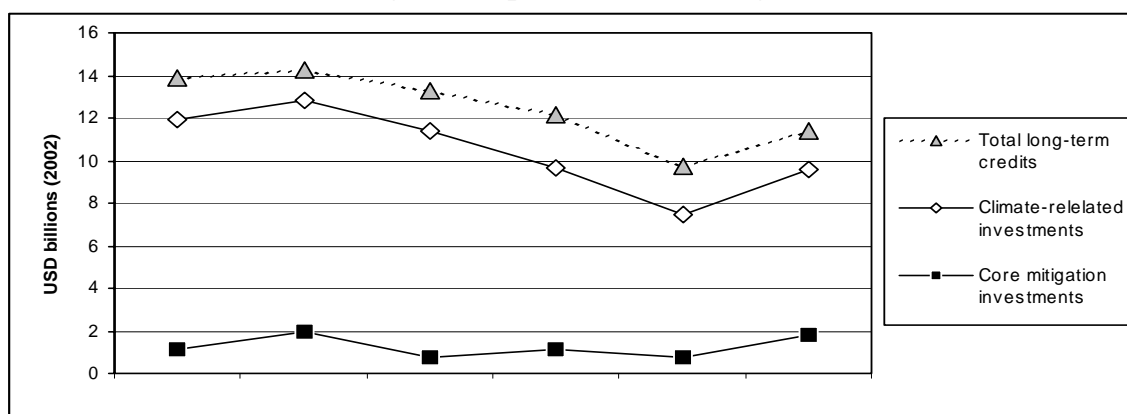
210. In addition to these sources, a number of reports on the climate impacts of ECA activities have been prepared by ECAs themselves,¹⁸ as well as by some research organizations.¹⁹

211. Given the focus of this report on core mitigation investments, the data compiled reflect less than five per cent of total ECA financing and insurance activity. In 2003, ECAs provided investments worth USD 649 billion, including USD 569.6 billion in short-term credits, USD 66.4 billion in medium- and long-term credits and direct financing, and USD 13 billion in investment insurance.²⁰ Due to the focus on infrastructure financing and limitations in the OECD data, this report only examines the long-term export credits. Based on the OECD data, in 2003 ECAs provided USD 60.1 billion in medium-term and long-term credits, of which USD 21.0 billion was in long-term credits. Developing countries received slightly more than half, USD 11.7 billion, of these long-term credits.

ECA investment by sector and by region

212. In 2003, ECAs used long-term export credits to provide USD 1.8 billion of financing in **the core mitigation and climate relevant sectors in developing countries** (figure 9). This figure represents 19 per cent of the USD 9.58 billion in long-term export credit financing in all climate relevant sectors. Between 1998 and 2003, a period covered by the OECD data, ECAs financed an estimated USD 7.5 billion in the core mitigation sectors, which represents 12 per cent of the USD 62.9 billion in long-term credit financing in all climate relevant sectors.

Figure 9. Total ECA core mitigation and climate relevant investments, and long-term export credit financing for 1998–2003



Source: OECD statistics on export credit activities

213. Two aspects of these trends are important. First, as with the other investment sources, ECA investments in core mitigation sectors are much lower than those in climate relevant sectors. Second, investments in climate relevant sectors represent a large share of all ECA long-term export credits. This

¹⁸ For example, *Climate Change: Assessing Our Actions* from the United States Overseas Private Investment Corporation (October 2000).

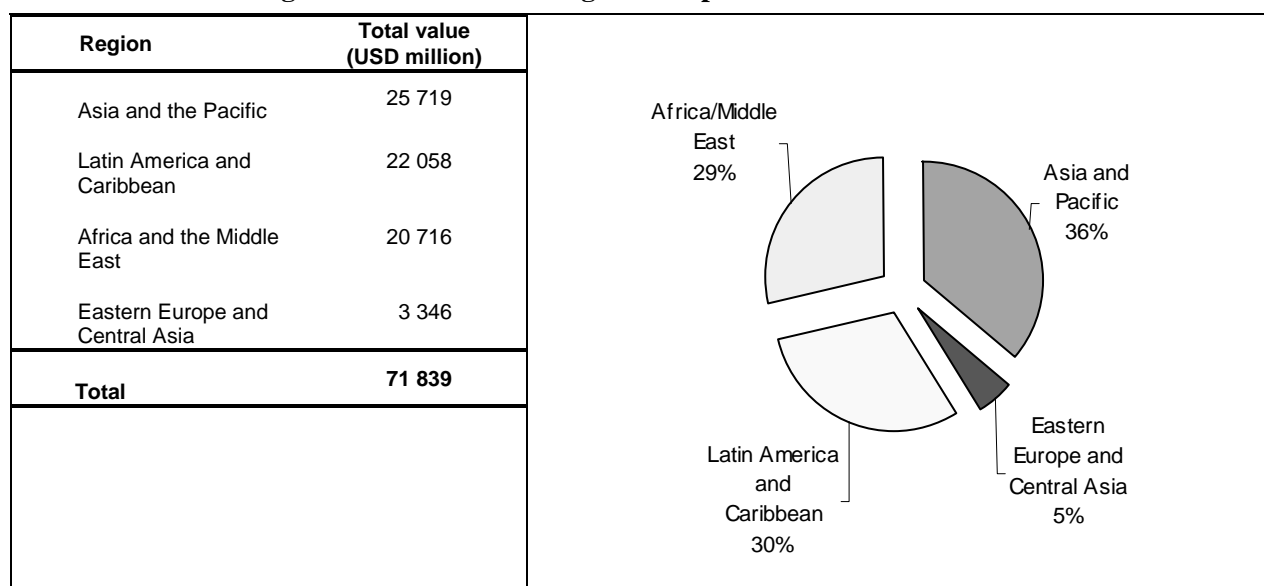
¹⁹ Center for Clean Air Policy: *Harnessing Financial Flows from Export Credit Agencies*; and World Resources Institute: *The Climate of Export Credit Agencies* (2004).

²⁰ See footnote 15.

suggests that a considerable amount of long-term ECA investment has substantial implications for emissions of GHGs and that opportunities exist to increase the share of core mitigation investments.

214. The examination of the **all long-term export credits by the ECA across regions** suggests that since 1998, Asia and the Pacific received the largest share of all long-term export credits going to developing countries, followed by Africa and the Middle East and Latin America and the Caribbean with almost equal shares (figure 10). In Eastern Europe and Central Asia, total long-term credits have been declining since 1998, leaving this region with a much lower share of financing after six years than the other regions.

Figure 10. Total ECA long-term export credits for 1998–2003



Source: OECD Statistics on Export Credit Activities

Lessons learned on ECA investment in mitigation

215. **On the lessons learned by the ECA**, it is encouraging that many ECAs have been recently moving toward greater transparency and more thorough screening of projects for environmental and social impacts in response to a need to carefully consider such impacts. This effort is still largely focused on reducing negative impacts rather than promoting positive environmental impacts, such as mitigating emissions of GHGs. For example, Spain's Export Credit Agency (CESCE) reported that of the 246 projects it reviewed for financing in 2004, only 12, including 3 renewables projects, were categorized as category A (defined as likely to have high environmental impacts) and subjected to the most extensive environmental review process.²¹ For most ECAs, including CESCE, only category A projects involve environmental reviews, and only a handful of ECAs make those reviews publicly available. Sweden's EKN has taken an encouraging step of introducing a fourth category to its environmental reporting to flag those projects likely to improve the environment.

216. A few ECAs have focused considerable attention specifically on reducing the climate impacts of their financing. The United States Overseas Private Investment Corporation (OPIC) issued a report *Climate Change: Assessing Our Actions*. This report examined the GHG emissions of OPIC's entire energy sector portfolio from 1990 through 1999 and considered projected emissions through 2015. The majority of OPIC's portfolio was in natural gas power generation, but a large and growing portion was in renewables.²² At the level of specific projects, there has been growing interest among ECAs in financing

²¹ CESCE, *Environmental Policy Statistics and Experience: Experience During 2004* (February 2004).

²² OPIC, *Climate Change: Assessing Our Actions* (October 2000).

renewable energy projects. The United Kingdom's ECGD has created a Renewables Initiative, but has yet to initiate projects.

217. **On the lessons learned from the compilation exercise**, the largest problem facing the analysis of the role of ECAs in mitigation financing remains the low level of transparency in reporting and inconsistencies in the reporting by individual ECAs. Over the period covered in this paper, the level of reporting has improved substantially, but it is still not as extensive as that for ODA.

218. At the same time, a number of ECAs moved to the forefront in considering the environmental impacts of the projects they finance. This impact could be even greater given that the ECA investments usually help to attract additional private investments. A few of them have notable mechanisms for making information on individual projects, on both at the level of financing and environmental and social impacts, available to the public. Nonetheless, the publicly available data are still insufficient for a fully accurate assessment of mitigation investments.

E. Private sector investments relating to mitigation

219. In addition to the investment sources covered so far, two other major sources are important, which were only partly addressed in the previous report on funding needs (FCCC/SBI/2004/18). First are the private banks and other businesses investing in infrastructure, technology and equipment in developing countries, called here "private infrastructure investors". Because the markets in which these investors are operating are changing quickly and new actors are entering at a rapid rate, only a sample list can be provided at any one time (see the list in annex II). The other subcategory includes the public, public-private and private providers and purchasers of GHG credits from developing countries sold in either the compliance or the voluntary markets, called often "carbon investors". This subcategory, including CDM, is not covered in this report, but relevant information is provided in paragraphs 220-223.

220. The CDM Executive Board has the mandate to make publicly available information on investment needs submitted to it for this purpose, on proposed CDM project activities in need of funding and on investors seeking opportunities, in order to assist in arranging funding of CDM project activities (further to Article 12.6 of the Kyoto Protocol), as necessary. To date, no such submissions have been made to the Board.

221. Regarding actual investment in registered CDM project activities, which may come from public or private sources in developed and/or developing countries, it should be noted that the CDM project design document (CDM-PDD) does not require disclosure of such information by the project participants (unless it is relevant for a specific purpose such as determining additionality in accordance with paragraph 6 of the CDM modalities and procedures). Only to the extent that public funding for CDM project activities from Annex I Parties is involved, an affirmation is required in the PDD that it does not result in the diversion of ODA and is separate from and not counted towards the financial obligations of Annex I Parties.

222. The availability of funding for CDM project activities depends on a range of factors, including the viability and attractiveness of an individual project to investors, the type of financial engineering applied, risk profiles and, not least, the overall expected demand for certified Emission reductions (CERs) for compliance purposes in the first commitment period of the Kyoto Protocol and beyond 2012. Demand for CERs also depends on the extent to which Annex I Parties pursue alternative means for achieving their targets under the Kyoto Protocol, such as domestic action, acquisition of assigned amount units under emissions trading, possibly coupled to "green investment schemes", and joint implementation. Restrictions of demand for CERs may further arise from provisions regarding "supplementarity" as referred to in decision 15/CP.7.

223. Information on registered CDM project activities as at 30 September 2005 is contained in the report of the Board to COP/MOP at its first session (FCCC/KP/CMP/2005/4). Updates on registrations and issuance of CERs are available on the UNFCCC CDM web site and will, together with information on the regional and subregional distribution of registered CDM project activities, be presented in the addendum to the report of the Board to COP/MOP at its first session. A comprehensive analysis, notably for identifying systematic or systemic barriers to their equitable distribution, as foreseen in paragraph 5 (h) of the CDM modalities and procedures, can meaningfully only be undertaken by the Board once a sufficient empirical basis and resources for this purpose are available.

224. There are a host of private organizations investing in climate related projects in developing countries that go beyond the Kyoto mechanisms. Some are global banks such as Citigroup and HSBC lending to new projects, see box 7.

Box 7. Environment initiatives at global banks

In the past several years, many international banks, which are mostly private and are involved in natural resource extraction and infrastructure projects, have increased the level of attention they give to environmental matters. Perhaps the best known are the 32 banks that as of July 2005 have agreed to the “Equator Principles”, such as Citigroup, HSBC, Banco do Brasil and West LB. These so-called “Equator Banks” have committed, inter alia, that they will only lend more than USD 50 million to a project if it meets the following criteria:

- It has been assessed for its potential environmental and social impacts
- It meets both national environmental and social requirements, as well as the International Finance Corporation’s environmental guidelines and safeguard policies
- The borrower provides that it will comply with the environmental management plan for the project.

In addition, several banks have recently agreed to go even further. For example, Citigroup, Bank of America and JP Morgan Chase have all announced expanded environmental initiatives, ranging from investments in sustainable forestry and renewable energy, to limits on their emissions of GHGs.

225. Some companies, such as ENEL and Tokyo Electric Power Company are investing in equity/ownership shares of infrastructure projects. Some are part of the growing number of local and regional lenders and sponsors, such as the Arab National Bank and Kookmin Bank. Finally, there are also a number of specialized funds focusing on investments in the environmental and clean energy sectors, such as the GEF and Solar Century.

1. Data sources and limitations in compilation of private infrastructure investments

226. The most readily accessible source of data on private infrastructure investment is the World Bank’s PPI database. The PPI database “tracks information on more than 2,700 infrastructure projects with private investment in the energy (electricity and natural gas), telecommunications, transport, and water and sewerage sectors in low- and middle-income countries.”²³ In compiling information on projects included in the PPI database, the following limits have been recognized:

- Project data are incomplete in some cases, as either technology or amount invested was missing
- The only climate relevant sectors covered are energy and transport
- The exact amount of the total private investment was not provided, but rather estimated using the low end of the range of 85–90 per cent of total investment reflected in the project totals

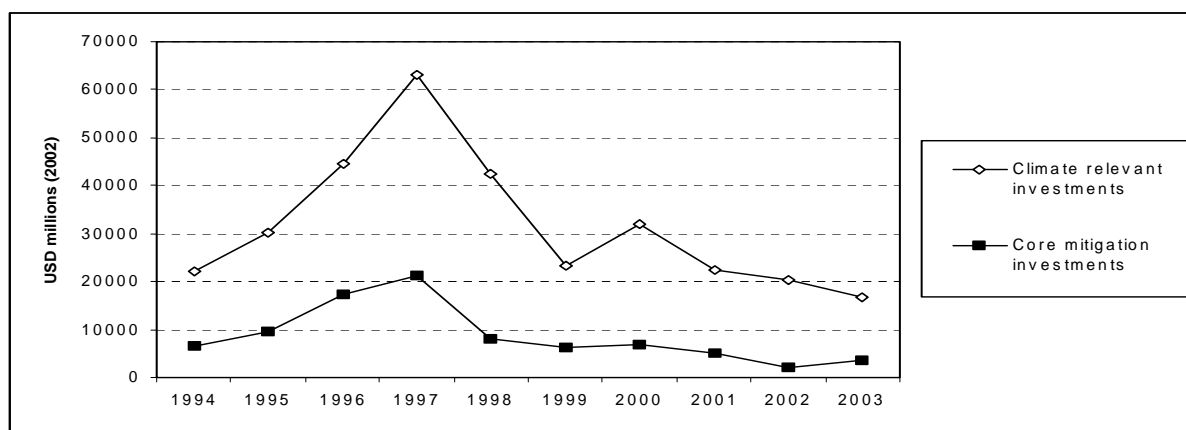
²³ <<http://ppi.worldbank.org>> (accessed 17 June 2005).

- The PPI database focuses only on the largest projects attracting the largest amounts of investment; as such, it will never reflect the myriad of smaller projects or investments that will be a large part of any serious effort to mitigate emissions of GHGs.²⁴

2. Trends in private investments relating to mitigation

227. The annual investment by the **private infrastructure investors in core mitigation projects** in developing countries from 1994 to 2003, according to the PPI database, has ranged from about USD 2 billion in 2002 to USD 21 billion in 1997 (figure 11). The investment trend mirrors the more general pattern of private capital flows to developing countries over the past decade – a large increase in the mid-1990s, followed by a steep decline as a result of the financial crisis in Asia and related currency devaluations, and a recent recovery.²⁵

Figure 11. Estimated total annual private investment in core mitigation and climate related sectors for 1994–2003



Sources: PPI database; Izaguirre, 2004.

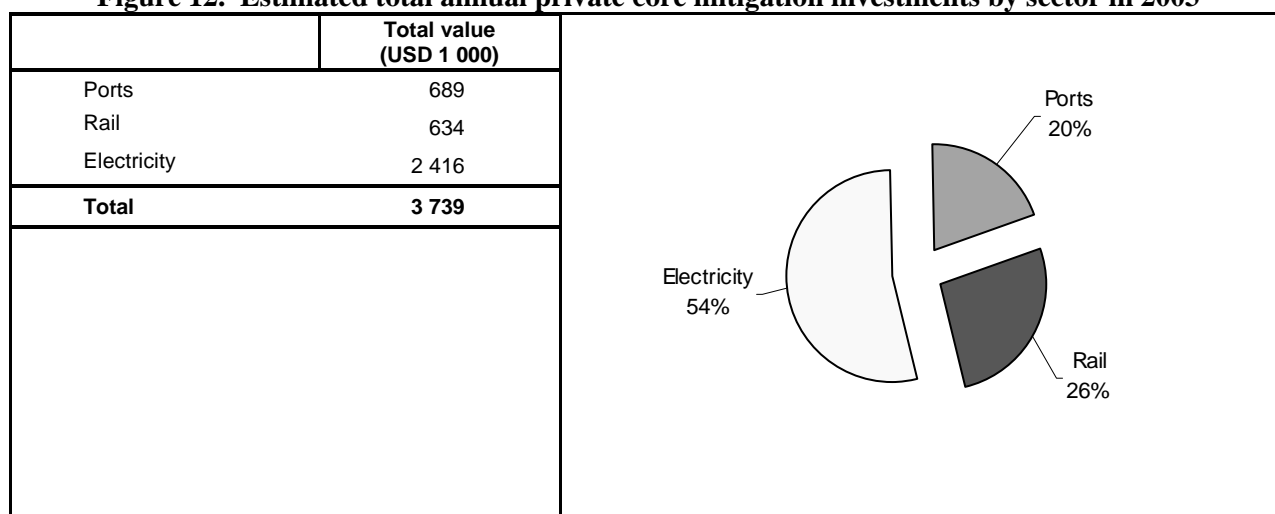
228. In the period from 1994 to 2003, a total of more than USD 86 billion (in 2002 dollars) was placed in core mitigation energy and transport projects by private infrastructure investors. In 2003, alone core mitigation investments were distributed across the three sectors considered (energy, in particular electricity, and transport, in particular rail and ports) as shown in figure 12. The total investment was distributed across the regions as shown in figure 13.

229. It is important to compare **the core mitigation investments to climate relevant investments made by the private infrastructure investors** within a range of sectors that are relevant to climate change, which may have a positive or negative impact on emissions, see figure 11. This approach adds investments in coal and diesel-fired power stations, as well as in natural gas facilities, roads and airports, to the data presented above. This comparison, though, is somewhat overstated, as the available data did not allow the exclusion of the investments in climate relevant sectors in the EIT countries – Annex I Parties which are not included in the data on the core mitigation investment.

²⁴ For example, virtually none of the emission reduction projects that have been registered under the clean development mechanism and described in section III.E.2 will be reflected in the PPI database (with the possible exception of large renewable energy projects).

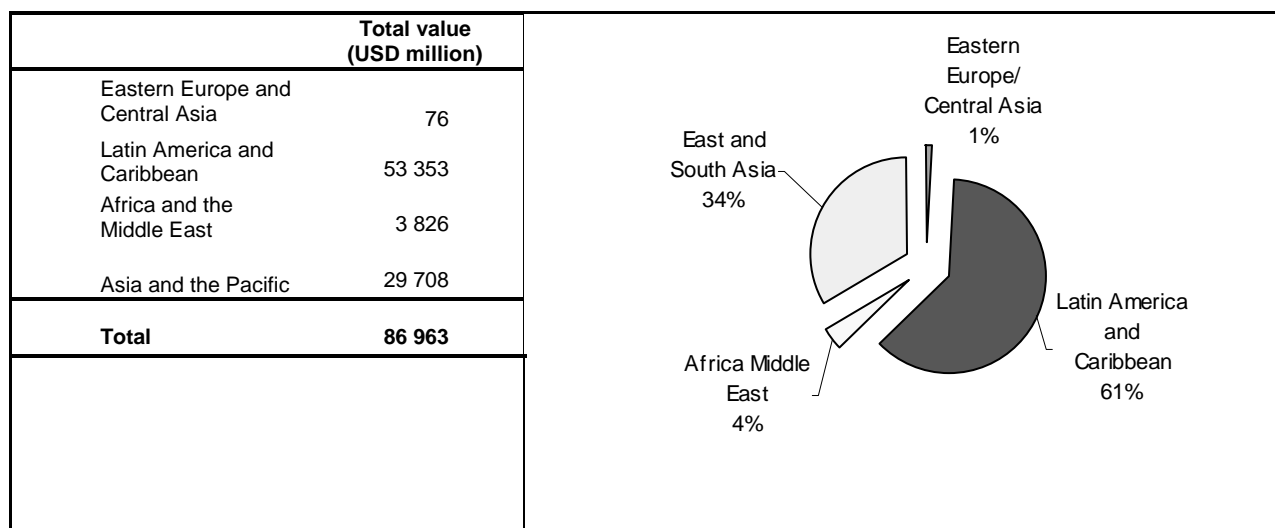
²⁵ World Bank, *Global Development Finance 2005* (Washington, DC: World Bank, 2005), <<http://www.worldbank.org/prospects/gdf2005>>.

Figure 12. Estimated total annual private core mitigation investments by sector in 2003



Source: PPI database.

Figure 13. Estimated total annual private climate relevant investments for 1994–2003 by region



Source: PPI database.

3. Lessons learned on private infrastructure investments

230. **On the lessons learned by the private infrastructure investors**, it is important to note that the wide variety of private investors involved in climate relevant projects in developing countries leads to a wide range of different views about lessons learned and the best ways forward in promoting more private investment, which are of relevance not only for climate relevant projects, but for infrastructure more generally. The findings of the United Nations on the lessons learned from the private sector activities in ensuring environmental sustainability in the power sector according to the report *The Energy Challenge for Achieving the Millennium Development Goals* are summarized in box 8.

231. These findings are supported by views expressed in the literature that are generally representative of the trends in thinking about investments in developing countries within the private investment community. In particular, in explaining the 13 per cent drop in global infrastructure investments with private participation during 2003, Ada Karina Izaguirre (World Bank infrastructure

specialist) cited the following factors:²⁶ “the impact of macroeconomic crisis in developing countries”; “unfinished reforms needed to place infrastructure business on a commercial footing”; “underdeveloped local capital markets in most developing countries”; and challenging experience with recent deals that allocated risk in ways that left private sponsors and financiers – as well as Governments and taxpayers – unnecessarily exposed”.

Box 8. Foreign private investors in power sector in developing countries

The report *The Energy Challenge for Achieving the Millennium Development Goals* states that “Foreign private investors perceive little market opportunity and great risk in most developing countries. They have largely withdrawn from the power sector since 1998 because projected cash flows based on affordable energy prices and sales levels are too low to balance their perceived risks from investing in these markets.” Figure 11 illustrates this trend as investments in the power sector dominate the climate relevant investments shown there and broadly define the trend in these investments.

232. Aspects of this analysis are echoed by Robert Bestani (director-general of the private sector department at the ADB). In his view, and at least in many parts of Asia, “today’s problem is no longer a funding gap, it is a confidence gap”.²⁷ Although a possibility for profitable infrastructural investments in Asia exists, the reluctance of the private sector to go back to such investments appeared as a main hindrance to such investments. Many American and European firms have retreated to their home countries, whereas regional firms are still developing. Local capital markets are expanding, but access to global markets is still required to meet the investment needs of the region. He notes that “the single biggest problem is regulatory risk”.

233. The **three important lessons learned from the compilation exercise** in the search for data on mitigation investments made by private infrastructure investors concern **context, sources and scale**.

234. On the context issue, the trends in private investment relating to climate change in developing countries are dominated by drivers that are not necessarily related to climate change. These include broader governance structures, macroeconomic performance, currency risk, domestic capital markets and local economic growth. The implication of this is that any efforts to increase private investment in climate mitigation in developing countries could be successful if embedded in the local context driving investment in a particular country, including in the regulatory and legislative framework governing energy use and other sectors where emissions occur.

235. On the sources issue, it seems that commercial firms such as Dealogic maintain more detailed data than does the PPI and that these data could be used in future work on this issue. On the scale issue, many of the private investors that are working to mitigate GHG emissions are too small to appear in the aggregated data sources used here. Unless they are incorporated into expanded reporting about investments in carbon, renewables or energy efficiency by organizations such as the IEA or the World Bank, aggregated data on their investments will be available only by going to each firm individually.

F. Comparisons across the results for international financial institutions and international funds

236. Given the wide variations in data sources, collection methodologies, analytical assumptions, reporting formats and other factors discussed in the preceding sections, it is difficult to offer a precise aggregation of the investment data across the investment sources considered for mitigation. However, it is possible to prepare some initial indicative estimates as to the relative scales and trends of mitigation investment in non-Annex I Parties over the past few years. These estimates include trends over the parts

²⁶ Ada Karina Izaguirre, *Private Infrastructure Activity Down by 13 per cent in 2003* (Washington DC: World Bank, 2004) <<http://rru.worldbank.org/Documents/274izaguirre.pdf>>.

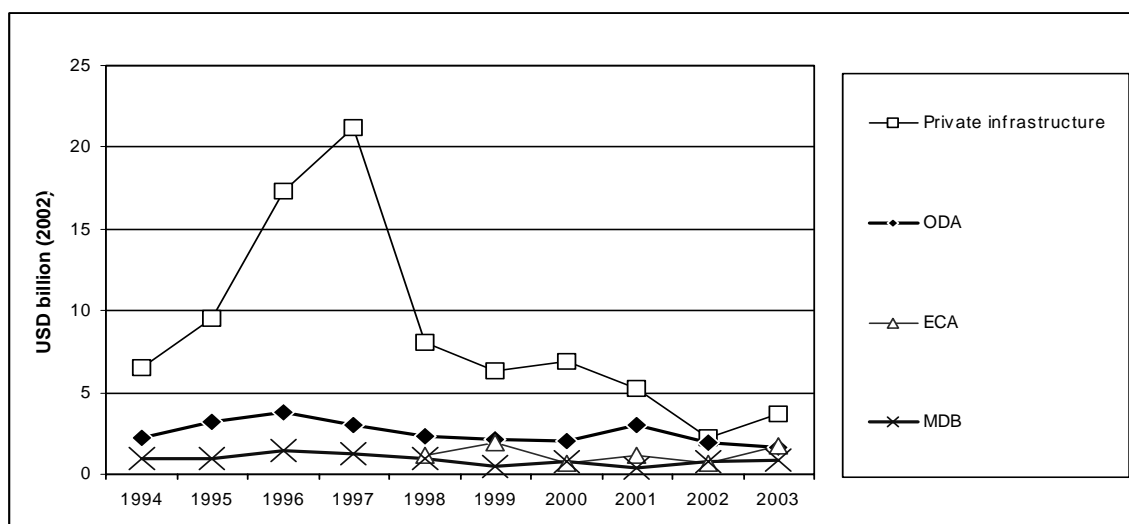
²⁷ Robert Bestani, “Ruling the rooster: Asian infrastructure no longer faces a funding gap, but a confidence gap” (special supplement to *Project Finance* March 2005).

of the period from 1994 to 2004 for which data were located. They also include a summary for 2003, the year for which the most complete data were available.

1. Trends in the core mitigation investment from 1994

237. Since 1994, a total of around USD 130 billion has been invested in core mitigation activities in developing countries.²⁸ The data compiled on the core mitigation investments made, by source, since 1994 are shown in figure 14.

Figure 14. Core mitigation investments made by the sources considered in this report for 1994–2003



Source: Summary of investment trends by source from the previous sections C, D and E of this chapter

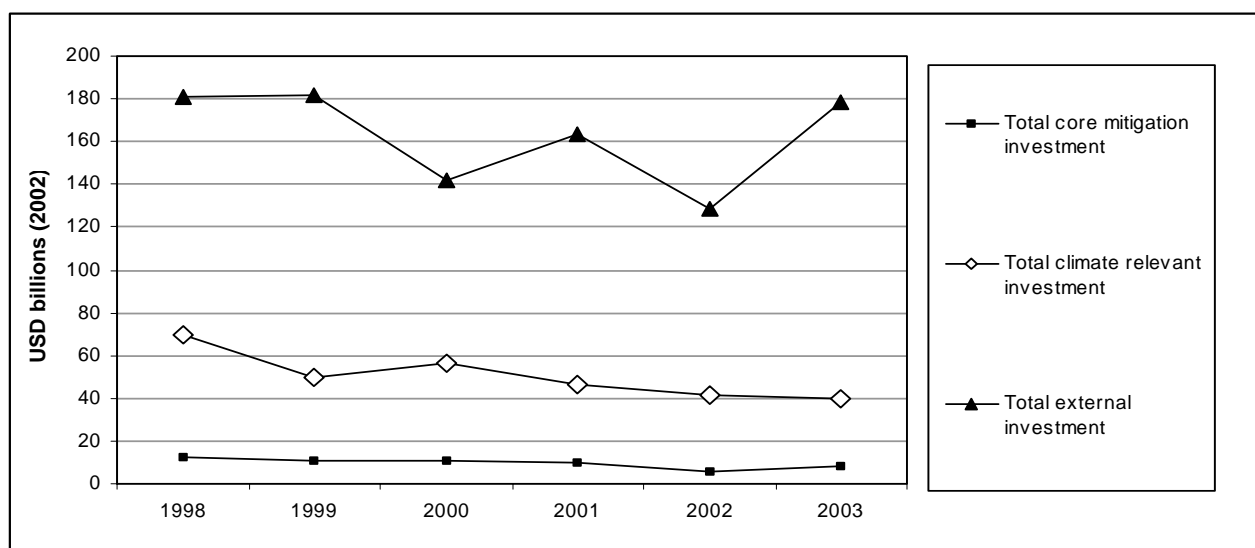
238. The comparison across the four sources of investments in mitigation suggests that:

- Private infrastructure flows dominate the core mitigation investments in developing countries;
- The second largest pool of money for core mitigation investments is ODA;
- There was a slight upturn in all investment in 2003 for most of the sources except for the ODA.

239. Since 1994, an **aggregate total of over USD 520 billion has been invested in climate relevant sectors**. The comparison of the core mitigation investments to both the broader range of investments in climate relevant sectors and the total external investment (public and private) going to developing countries is illustrated in figure 15. The main conclusion here is that core mitigation investments remain only a small part of both climate relevant investment and total external investment in developing countries. One possible implication is that the potential for more investment in mitigation is well beyond the one that is currently being used.

²⁸ Based on the data, assumptions and calculations described in previous sections, which give a conservative, low-end estimate of core mitigation investment given the difficulties of accessing data on MDB investments, finding data on all core mitigation sectors, and breaking out investments in non-Annex I Parties in the ECA region.

Figure 15. Core mitigation, climate relevant and total external investment to developing countries for 1998–2003



Sources: Core mitigation and climate relevant data aggregated from sections C, D and E of this chapter; Data on total external investment in the regions of interest from World Bank, 2005, *Global Development Finance*.

2. Total core mitigation investment in 2003

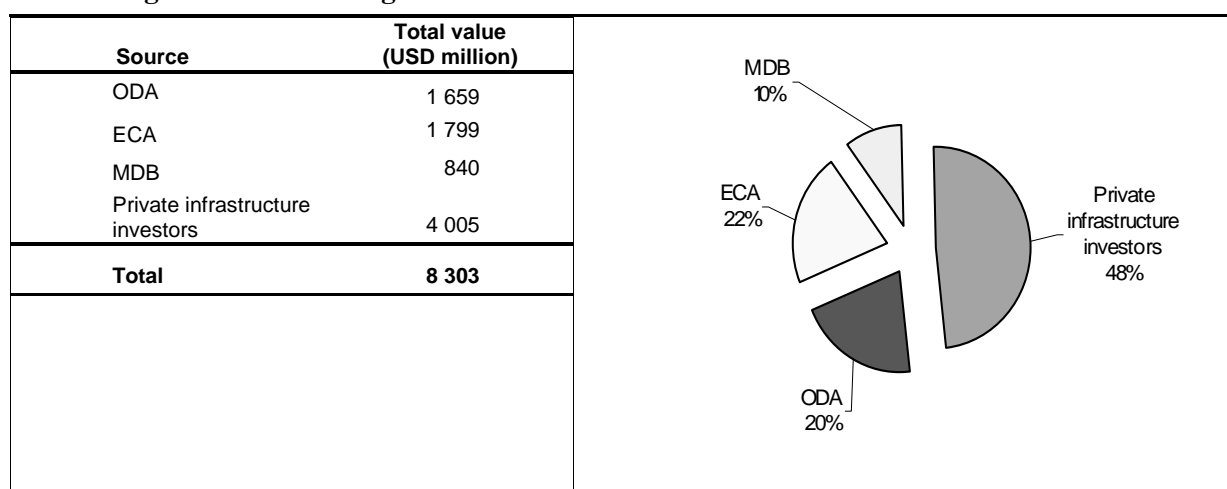
240. In addition to the investment trends, it is useful to examine the approximately USD 8.3 billion²⁹ estimated to have been invested in core mitigation sectors in 2003 across sources, sectors and regions.

241. One of the major conclusions from this distribution is that only 30 per cent of the core mitigation investment in 2003 came from the sources most widely identified with climate relevant investments in developing countries – MDBs and ODA (figure 16). This suggests that private investors, which are the major investment source (even in down years compared to the 1990s) and in many cases contribute to shifting the economic development of the developing countries towards less-carbon-intensive and more sustainable development pathways, could receive more attention to make the effort to promote mitigation a success. This also suggests that the role of the MDBs and the ECAs, which support such private (and public) investment and help to foster public–private partnerships, should not be understated.

242. As to the sectors where the core mitigation investments were made in 2003, the results shown in figure 17 underscore the dominance of the energy and transport sectors. The distribution by region suggests that Asia and Latin America received the largest share of these investments (figure 18).

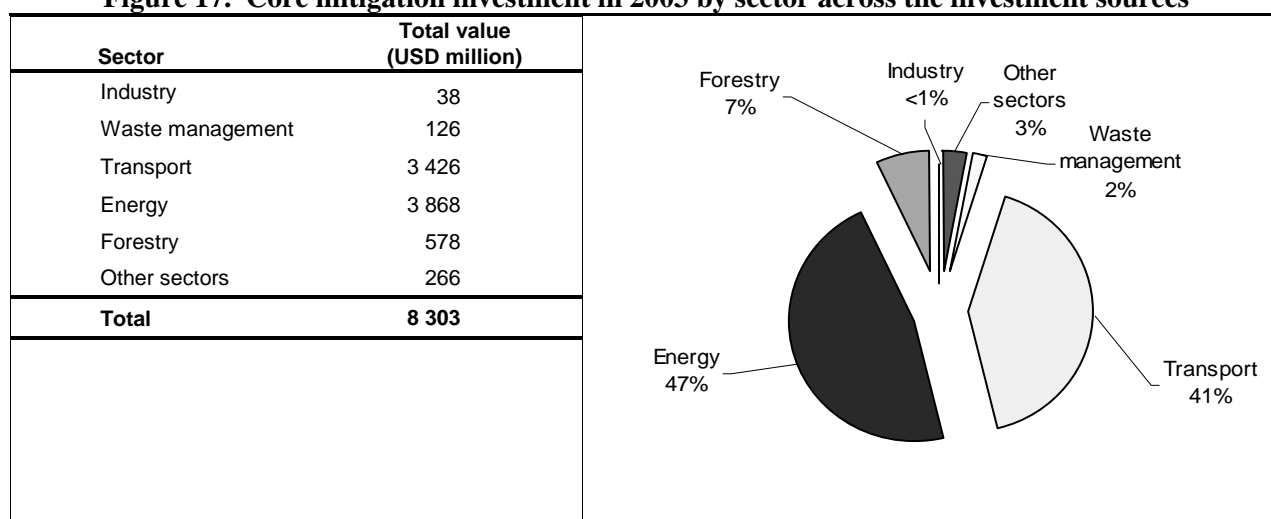
²⁹ Based on the data, assumptions and calculations described in sections C, D and E above, which altogether represent a conservative, low-end estimate of core mitigation investment.

Figure 16. Core mitigation investment in 2003 across the five investment sources



Sources: Aggregated from sections C, D and E of this chapter.

Figure 17. Core mitigation investment in 2003 by sector across the investment sources

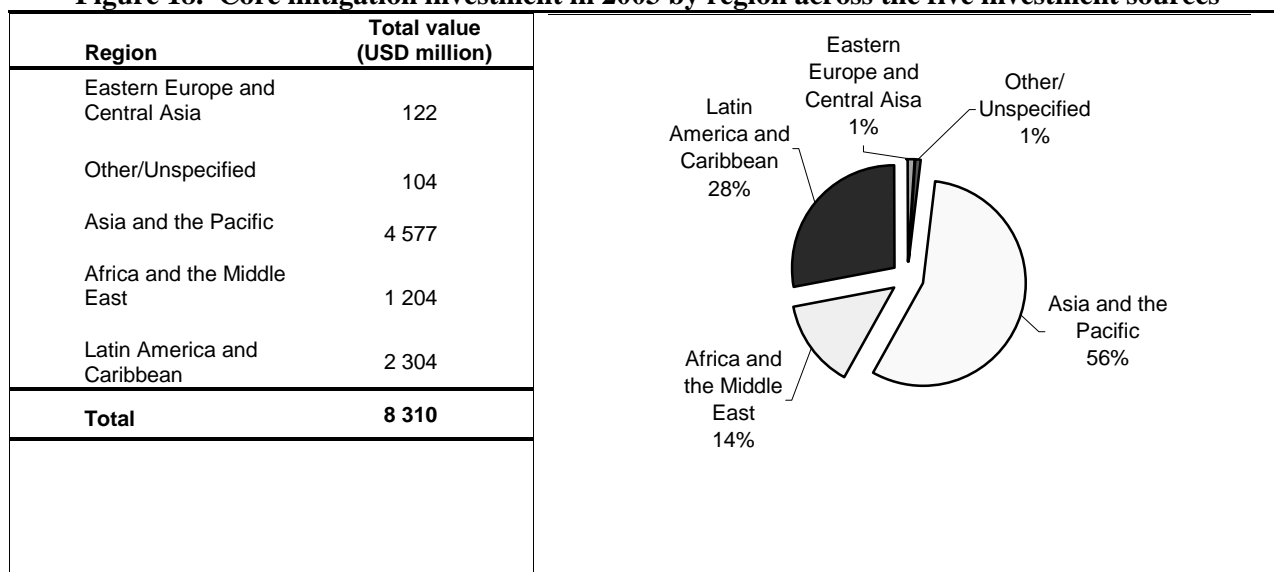


Sources: Aggregated from sections C, D and E of this chapter.

243. As shown in this analysis when considering both, the trend of the core mitigation investments since 1994 and the pattern of these investments in 2003, **the largest single source of investment in mitigation activities across developing countries remains private infrastructure investors.** Their investment, however, varies with broader economic conditions and is focused primarily on growing, middle-income countries.

244. ODA, which varies the least over time, is the second largest source and, in most cases, has been allocated to countries that are not receiving as much private investment. However, ODA flows are to remain smaller than overall private flows, posing the question of how best to use them to leverage greater amounts of more stable private investment.

Figure 18. Core mitigation investment in 2003 by region across the five investment sources



Sources: Aggregated from sections C, D and E of this chapter.

245. Given the difficulties of locating aggregated data on mitigation investments by MDBs, it is difficult to draw precise conclusions on the volume and trends in their activities.³⁰ However, it is clear that they have a major impact on many large infrastructure projects that have substantial climate implications and that they can serve as a catalyst for the development of new financing techniques (similar to the Prototype Carbon Fund). Similar issues arise when considering the available data on investments by ECAs, as well as their importance to many climate relevant infrastructure projects.

3. Relevance of experience of international funds and multilateral financial institutions to the investment needs of developing countries in the area of mitigation

246. Given the varying nature of the data compiled on investment needs by developing countries (qualitative data of areas of investment needs and illustrative examples of concrete projects) and the experience of the sources of investments covered by this report (highly aggregated quantitative information on core mitigation and climate relevant investments) it is difficult to draw conclusions at this stage about the relevance of the two issues. However, even at this stage, it become clear that the energy and transport sectors, which are a definite priority for investments in developing countries not only because of climate mitigation but also to meet broader development objectives and to avoid air pollution, congestion and health problems, received the largest share of the overall investments. Also, within the energy sector, some areas of investment, such as energy efficiency and renewable energy, are increasingly supported by practically all sources of investments.

247. Other areas of investment needs, such as agriculture, LULUCF, waste and industrial processes, received less investment compared to the other sources surveyed. This, however, does not necessarily mean less attention to these areas or lower priority given to them. This could rather reflect smaller infrastructure components in these areas compared to energy and transport. Also, the high level of aggregation may mask some important and emerging trends, such as the rapid increase in activities of private investors in support of projects on industrial gases.

³⁰ As discussed in section III.C, which suggests that the estimate of core mitigation investment by MDBs is an average of the data from three different sources, each of which is likely to underestimate the total investment made.

VI. Experience of international funds and multilateral financial institutions relevant to adaptation to climate change in developing countries

A. Sources of data and limitations

248. The purpose of the compilation of information on experiences of MDBs relevant to adaptation to climate change is to provide a comprehensive description of investment activities across the major, external sources of investment rather than to delve deeply into any particular institutions, projects or activities. Data were compiled from the following multilateral and international institutions and funds: World Bank, AfDB and African Development Fund (ADF), West African Development Bank (WADB), ADB, CABEI, EBRD, IADB, NDF, and the OPEC Fund.

249. Information was compiled from documents and records available on the Internet from MDBs on financing of projects, activities, and programmes in natural resource sectors that will be sensitive to climate change. The focus was on projects, activities, and programmes implemented during the past 10 years (1994–2004) pertaining to infrastructure investments.

250. This report does not include projects from other multilateral financial institutions usually referred to in the context of financial institutions with development mandates. These institutions are CDB, EADB, EIB, IDB, ISDB, and NIB. Sufficient information was not available for projects supported by the CDB and the ISDB. The initial research included activities of several international investment banks, including the EIB, IIC and the NIB. However, the investments made by these institutions were not included in the final analysis because they are not investing in the types of adaptation-related projects that were the focus of this study.

251. This report focuses specifically on investments by the international financial institutions in developing countries in projects, activities, and programmes associated with the development of infrastructure that can reduce vulnerability to the adverse impacts of climate change. Examples of these projects include rural and urban water supply projects, seed distribution networks, and the establishment of protected areas. These types of projects are typically undertaken by public (i.e. government) rather than private entities, as they do not typically produce financial returns sufficient to attract private capital.

B. Approach

252. The section of the report on adaptation provides summary data on topic areas of investment, by institution and sector, and provides observations regarding the nature of investment relevant to adaptation patterns in these topic areas. The types of investment, **grants, loans and equity investments**, are similar to those discussed in the mitigation part of the report, paragraph 168. Also, similarly to mitigation, the compilation focuses on investment in **infrastructure, technology and equipment** in climate sensitive sectors **relating to adaptation** and does not include investments in education or capacity-building relating to climate change or investments in companies producing goods or services that may be used for infrastructure development.

253. As a rule, these investments have been made to help countries develop without assuming that their climate will change. However, without in-depth analysis of each activity, which would be well beyond the scope of this report, it is not possible to determine how these investments could reduce vulnerability to climate change. Nonetheless, the level of investment in each sector can be viewed as a measure of the degree of interest by the international financial institutions in developing these **sectors that are sensitive to climate change and are, therefore, relevant to climate change adaptation**.

254. To the extent that the available data allow, the information is compiled and analysed according to the following **sectors, activities and issues**:

- Water resources, including municipal/rural water supply, irrigation water demand, and integrated watershed management
- Agriculture and food production, including crop production, livestock production, and fisheries
- Human health
- Forest and ecosystems management, including forest management, terrestrial ecosystems and biodiversity, freshwater ecosystems and biodiversity, and desertification
- Coastal zone and marine ecosystems management, including coastal development and infrastructure and coastal and marine ecosystems
- Disaster prevention and disaster risk management.

255. Unlike mitigation, where MDBs have invested in mitigation projects since the early 1990s, adaptation, although enshrined in the Convention, received attention in the international context only in recent years. With a very few exceptions, self-defined projects and activities are missing. This is why **the approach for compiling information on adaptation differs from that used for mitigation**. For mitigation a summary of information provided within the reports of a large number of institutions was used, without going to the project level, except for a few sources. For adaptation, this approach was not applicable; instead, the individual projects of a number of representative institutions were considered to ascertain the relevance of these projects to adaptation. Yet, this does not mean detailed examination of these projects, which could ascertain that they may decrease vulnerability to climate change (see, for example, paragraph 280 on coastal zone management).

256. A description of the criteria used to select projects and activities in the compilation of information within these sectors and subsectors is provided in annex III. It should be noted that many investment projects have multiple components often directed at multiple sectors. Each project was listed under the sector that appeared to be receiving the most emphasis. Also, many of the World Bank projects have multiple components in multiple sectors. In most cases, information was available regarding what percentage of the funding was going to which sector or component, and the project was included in multiple sector categories with the appropriate value attributed to each. Where sufficient information on the sectoral components of projects was not available, the project was not counted, which avoided attributing too much funding to a sector. Finally, values are given for the project as a whole – multiple donor organizations may be involved in funding a given project.

257. Similarly to the compilation of information on mitigation, only investments in non-Annex I Parties to the Convention are considered in this paper, following the regional grouping as shown in paragraph 172. The time frame for the compilation is from 1995 to 2005.

C. Multilateral development bank investment in projects and activities relating to adaptation

258. A summary of the approaches and practical experiences of two MDBs that account for a large share of projects relevant to climate change adaptation is provided in box 9.

Box 9. Adaptation in MDBs

MDBs do not have any specific safeguards or technical standards for adapting to climate change. In principle, other existing policies, including those on environmental impacts assessments and disaster mitigation, could trigger attention to adaptation. In practice, however, project documents and country plans rarely pay explicit attention to climate risks, and very rarely consider changing risk profiles under climate change (see, e.g., Burton and Van Aalst, 1999, 2004).

The World Bank is currently developing a risk screening tool that will provide a quick check of potential issues that might arise in project design or implementation, provide a lead into appropriate knowledge and experience, and increase awareness of climate variability and change issues. In the first instance, this tool will be presented as a service to project managers, rather than as a new safeguard that would have to be followed in all projects.

The World Bank is also generating practical experience in implementing adaptation through a number of pilot activities, including an integrated adaptation project for high altitude ecosystems, insular areas, and human health in Colombia, and a project to integrate adaptation into economic planning in Kiribati (both projects will be supported by the GEF's Strategic Priority on Adaptation). Adaptation to climate change and natural hazard risk reduction is also very prominent in the World Bank's Pacific Islands Regional Strategy (World Bank, 2005c), continuing the groundwork in the 2000 Regional Economic Report for the Pacific Islands (World Bank, 2000b). In the Caribbean, the project "Caribbean: Planning for Adaptation to Climate Change (CPACC)" has been followed by the Mainstreaming Adaptation to Climate Change (MACC) project.

In Bangladesh, results from a comprehensive climate change analysis (World Bank, 2000a) were reflected in several subsequent projects, although the impacts on senior policy makers and the overall country dialogue between the World Bank and Bangladesh were limited (Huq, 2003). The Bank is currently engaged in several pieces of research and technical support work in India that have strong commitment by national and state senior policy makers and senior Bank staff. This work focuses on the challenges with managing agricultural development and water supply in drought- and flood-prone regions in a changing climate (World Bank, 2005a).

The ADB has experimented with mainstreaming adaptation through the Climate Change Adaptation Program for the Pacific (CLIMAP), which focused on mainstreaming climate change adaptation into ADB projects and country assistance dialogues, including by providing technical assistance for the ADB's Pacific Department strategy and project preparatory processes; and into development planning and implementation in two selected Pacific Island countries (the Cook Islands and the Federated States of Micronesia).

1. Investment by sector

259. This section provides an overview of the projects in each sector relevant to adaptation. As shown in figure 19, MDBs invested almost USD 300 billion in projects in the primary sectors relevant to adaptation to the impacts of climate change between 1994 and 2004. About two thirds of this spending, almost USD 200 billion, was on water resources projects. Projects in the agriculture and food production and the disaster prevention and risk management sectors each received investments of about USD 32 billion, 11 per cent of the total. Far less was invested in projects in the coastal zone and marine management and health sectors, which received approximately 1 per cent and less than 1 per cent of all investment funding, respectively. It should be noted, however, that these results reflect only the value of infrastructure investments, i.e. the basic equipment, utilities, productive enterprises, installations, and services essential for development, operation, and growth. They do not reflect investments in planning activities, such as feasibility studies, or in education, such as campaigns to educate the public on disease prevention. The implications of this are discussed in section IV.D of the report

260. Of the USD 197 billion invested in water resources projects between 1994 and 2004, about 54 per cent was spent on municipal and rural water supply projects (figure 20). An example of such a project is ADB's USD 12.6 million Rural Drinking Water Supply and Sanitation Program in Benin, which is focusing on deepening boreholes and expanding rural water supply networks. Another 41 per cent has been invested in irrigation projects, such as the Irrigation Rehabilitation and Modernization Project in Lebanon, in which the World Bank is investing USD 446 million. Only about 5 per cent of the investments were directed towards integrated watershed management. An example of

such a project is the Sustainable Management of the Lake Amatitlan Watershed project in Guatemala, in which the OPEC Fund is investing USD 29.8 million.

Figure 19. Investments in infrastructure projects by primary sector for 1994–2004

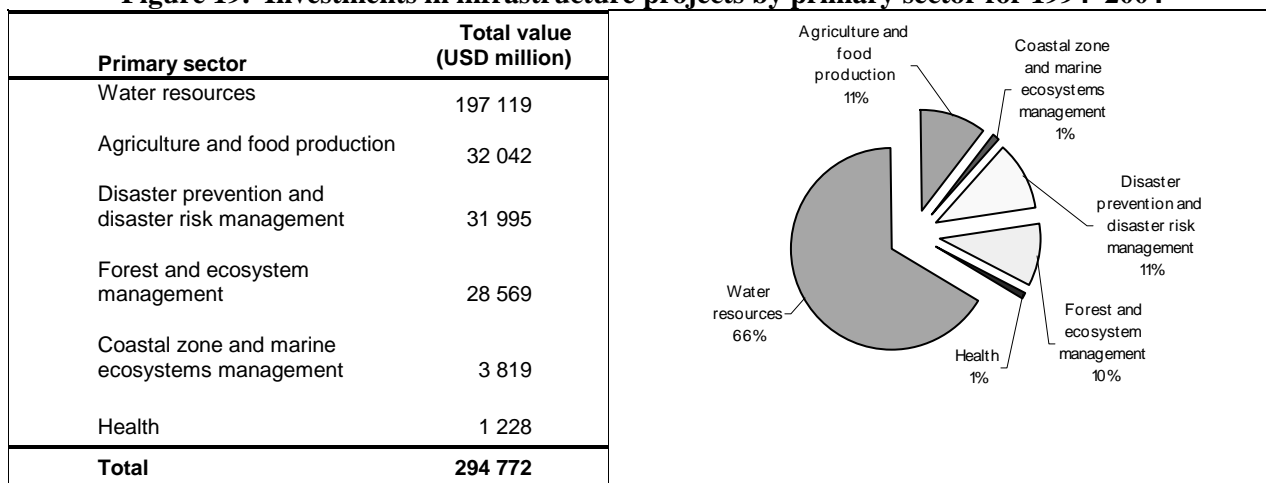
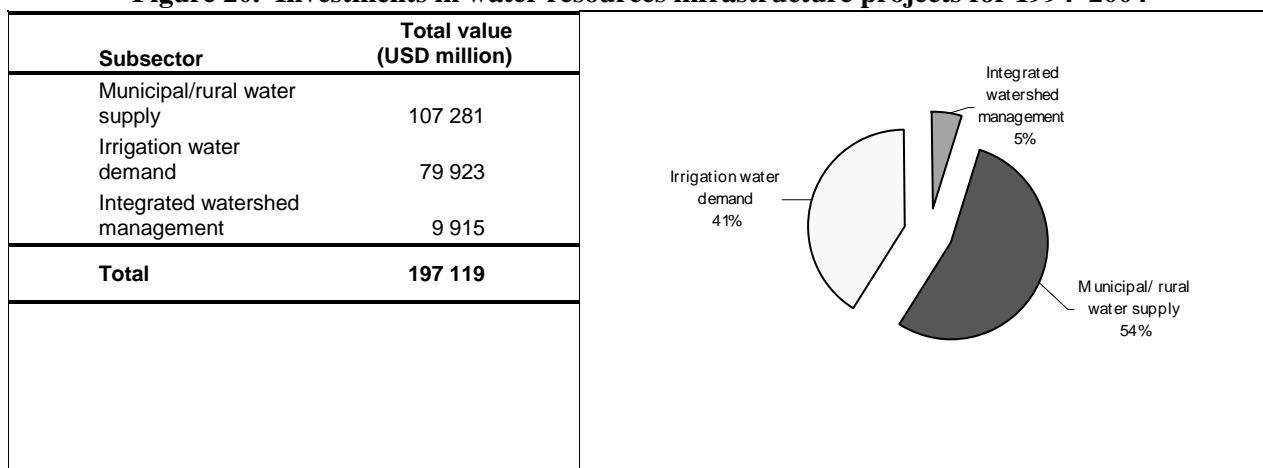


Figure 20. Investments in water resources infrastructure projects for 1994–2004

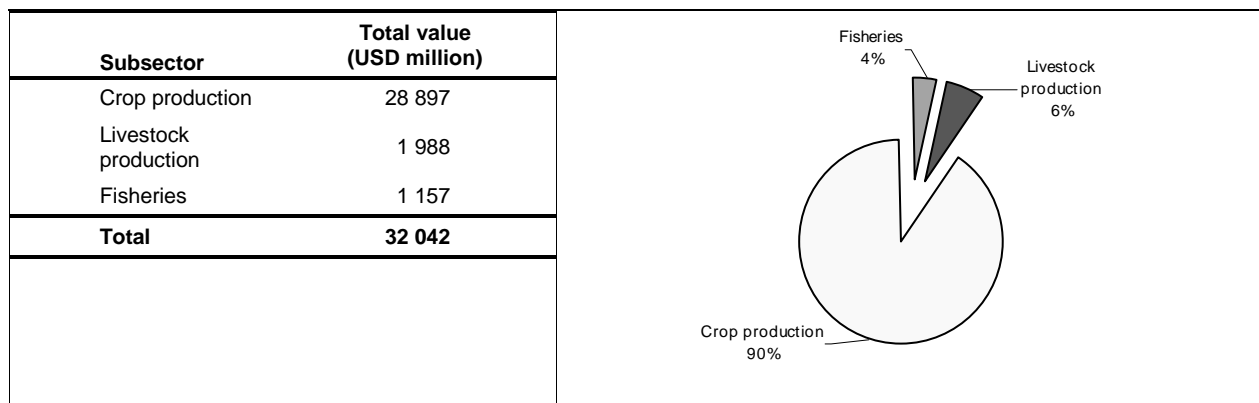


261. The vast majority of the USD 32 billion in investments in the agricultural production sector has been directed towards crop production (figure 21). This includes a wide variety of projects, including land acquisition and the development of seed distribution and crop enhancement systems. One such project is the USD 265 million Community-Based Rural Land Development Project in Malawi being funded by the World Bank. Only 6 per cent of the projects were associated primarily with livestock production, such as the USD 22 million Community Livestock Development Project in Nepal, which is being funded by the ADB. Only 4 per cent of investments were directed towards fisheries development, such as the USD 71 million Sustainable Aquaculture for Poverty Reduction project in Indonesia, funded by the ADB.

262. About USD 32 billion has been invested in disaster prevention and risk management infrastructure projects. Many of these are large flood prevention projects, such as China’s Yangtze Dike Strengthening Project in which the World Bank is investing USD 5.3 billion. Another example is the Emergency Recovery & Disaster Management Project being undertaken in St. Kitts and Nevis, St. Lucia, Dominica, Grenada, and St. Vincent and the Grenadines. The World Bank is investing USD 114 million in this project, which is intended to fortify, reconstruct, or rehabilitate key economic and social

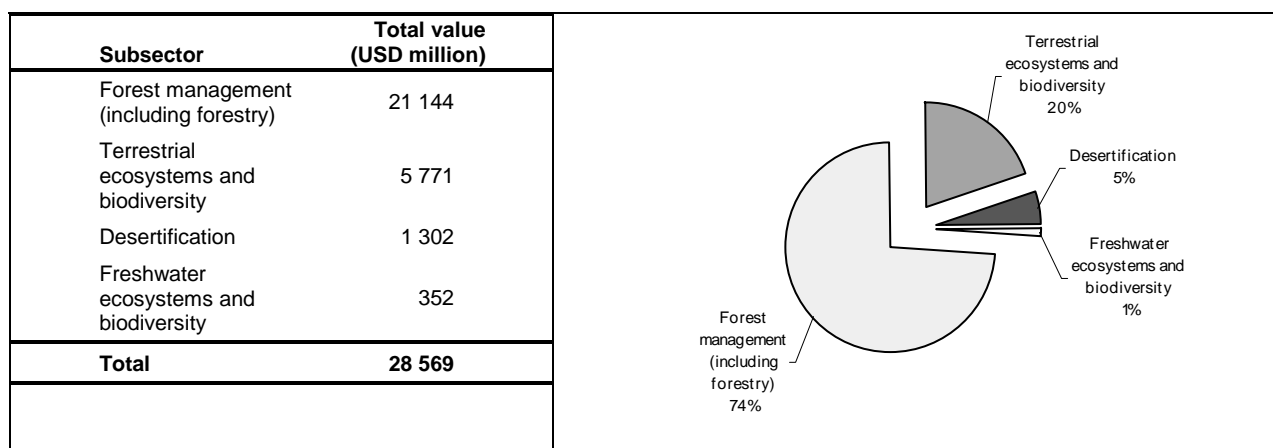
infrastructure and facilities to minimize damage or disruption caused by future natural and man-made disasters and to speed emergency recovery following such disasters. This project also includes a capacity-building component (not considered in the report) intended to strengthen the institutional capacities of these countries to prepare for and respond to disaster emergencies efficiently and effectively.

Figure 21. Investments in agriculture production infrastructure projects for 1994–2004



263. Almost three quarters of the almost USD 29 billion in investments in the forest and ecosystems management sector have been related to forest management and forestry (figure 22). An example of such a project is the Sustainable Forest Management in Cambodia project in which the ADB has invested USD 980 million. Twenty per cent of the investments targeted terrestrial ecosystems and biodiversity, and 5 per cent of the investments were directed towards combating desertification. An example of the former is China’s Ningxia Yinchuan Integrated Ecosystem Management project, in which the ADB is investing USD 500,000. An example of the latter is Kenya’s Arid Lands Resource Management Project, in which the World Bank has invested USD 17.5 million. Only 1 per cent of the investments were related to freshwater ecosystems and biodiversity, such as the Pasig River Environmental Management and Rehabilitation Sector Development Program in the Philippines. The ADB and the Philippines have each invested USD 75 million in this project.

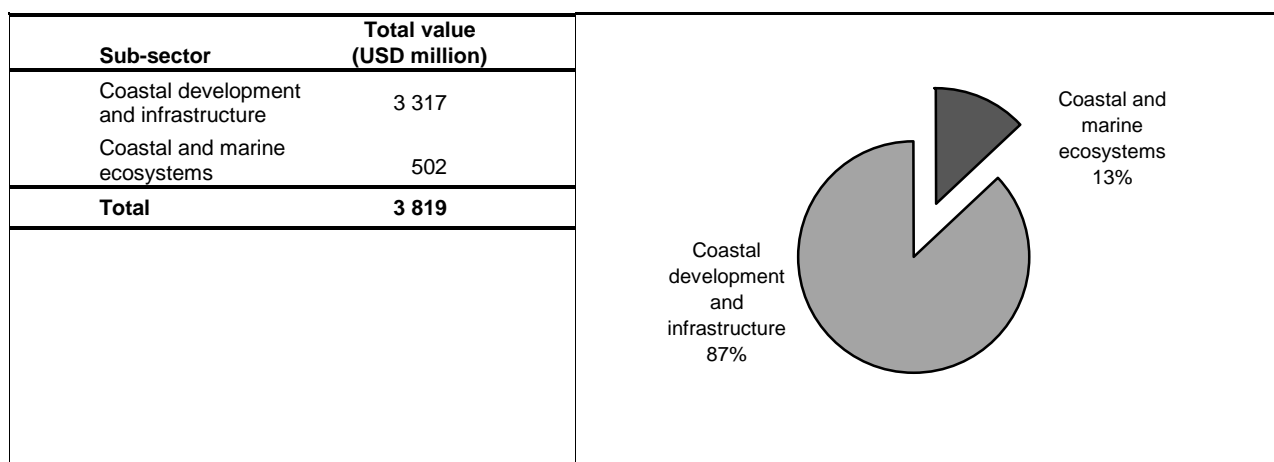
Figure 22. Investments in forest and ecosystems management infrastructure projects for 1994–2004



264. Most of the USD 4 billion in investments in coastal and marine ecosystems management infrastructure projects were directed towards coastal development and infrastructure (figure 23). One such project is the USD 800,000 Aquatic Resource Development and Quality Improvement in the Philippines project, being funded by the ADB. Only about 13 per cent of the investments were related to

the protection of coastal and marine ecosystems. Many of these are related to the protection and rehabilitation of coral reefs, such as Indonesia’s Coral Reef Rehabilitation and Management project.

Figure 23. Investment in coastal and marine resources infrastructure projects for 1994–2004



265. The USD 1.2 billion of infrastructure investments in the health sector constitutes less than 1 per cent of the total value of all the projects examined for this study. As discussed further in section IV.D of the report, this may be attributed to the fact that many health-related projects focus on education and capacity-building rather than infrastructure development. An example of a health sector project included in this analysis is the USD 17.5 million Social Services Delivery project in Kyrgyzstan, being supported by the OPEC Fund, focusing on the renovation of schools, health centres, clinics, and hospitals to strengthen the delivery of rural health and education services in that country’s southern provinces.

2. Investment by source

266. The **World Bank is by far the largest investor in projects in sectors relevant to adaptation**, contributing 96.6 per cent of the total USD 295 billion being invested in these projects (table 2). Of the remainder, the ADB contributed 2.8 per cent and the other regional banks and international sources made up the remaining 0.6 per cent of this total.

267. As shown in figure 24, about 65 per cent of the World Bank’s investment is in water resources projects, about 30 per cent is in the agricultural production, forest and ecosystems management, and disaster prevention and management sectors, and most of the remainder is in coastal and marine ecosystems management projects. The dominant share of the World Bank investment in sectors relevant to adaptation is explained by the Bank’s overarching mandate for development, poverty alleviation and sustainability, which are broadly linked to climate sensitive sectors. It could be explained also by the overall size of the Bank’s assets.

268. About 66 per cent of USD 8.3 billion in investments by the ADB are also in the water resources sector, with another 20 per cent in the agricultural production and disaster prevention and risk management sectors. The investment pattern of the ADB differs from that of the World Bank in that the ADB spends only about 7 per cent of its investments on the forest and ecosystems management sector, with the remainder split between the health and coastal zone and marine ecosystems management sectors.

269. Investment patterns among the remaining investment sources vary. Some, such as the OPEC Fund, the EBRD, the WADB, and the NIB, are similar to the two largest institutions (WB and ADB) in that a majority of their investments are in the water resources sector. The remaining institutions, the

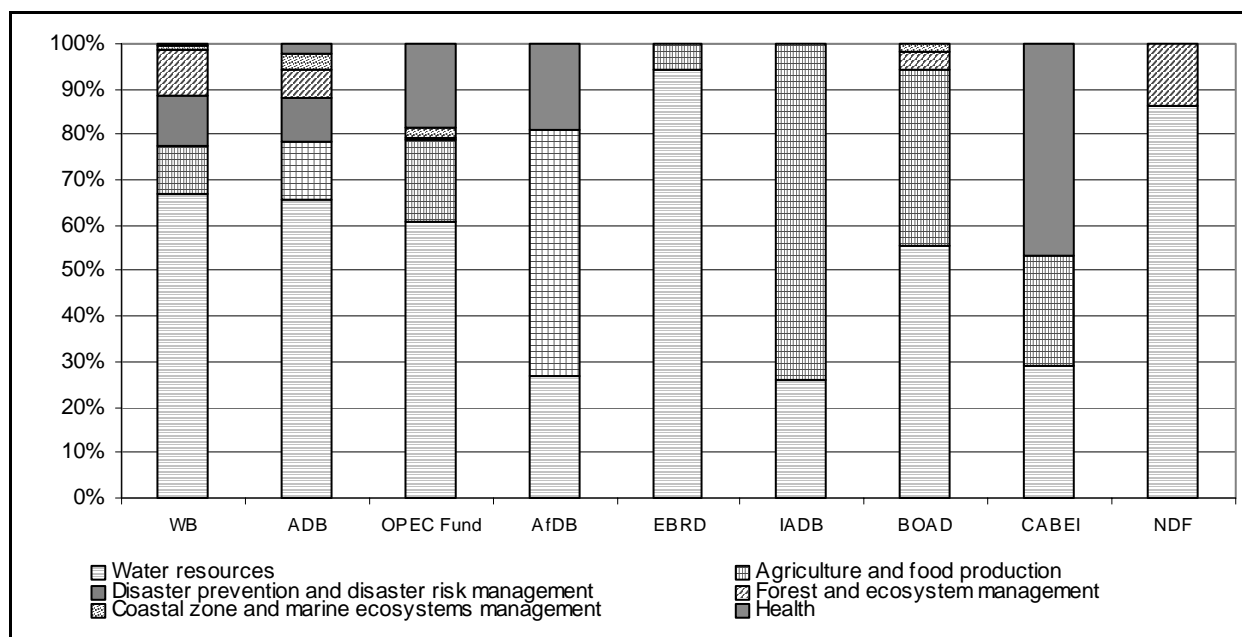
AfDB, the CABEI, and the IADB focus a larger portion of their investments on other sectors. Notably, only the CABEI invests a substantial amount of its investment funding on infrastructure projects in the health sector, and the IADB only invests in agriculture projects.

Table 2. Total investment in relevant to adaptation, by funding sources (USD million)

| Funding agency/institution | Water resources | Agriculture and food production | Disaster prevention and disaster risk management | |
|--|-----------------|---------------------------------|--|--|
| World Bank | 190 735 | 30 480 | 31 194 | |
| Asian Development Bank | 5 463 | 1 070 | 801 | |
| OPEC Fund | 531 | 156 | | |
| African Development Fund | 79 | 160 | | |
| European Bank for Reconstruction and Development | 202 | 13 | | |
| Inter-American Development Bank | 46 | 131 | | |
| West African Development Bank | 33 | 23 | | |
| Banco Centroamericano de Integracion Economica | 11 | 10 | | |
| Nordic Development Fund | 18 | | | |
| Total for sector | 197 119 | 32 042 | 31 995 | |

| Funding agency/institution | Forest and ecosystem management | Coastal zone and marine ecosystems management | Health | Total project value |
|--|---------------------------------|---|--------------|---------------------|
| World Bank | 28 045 | 3 500 | 822 | 284 776 |
| Asian Development Bank | 514 | 298 | 174 | 8 319 |
| OPEC Fund | 5 | 20 | 160 | 871 |
| African Development Fund | | | 55 | 294 |
| European Bank for Reconstruction and Development | | | | 215 |
| Inter-American Development Bank | | | | 177 |
| West African Development Bank | 2 | 1 | | 59 |
| Banco Centroamericano de Integracion Economica | | | 18 | 39 |
| Nordic Development Fund | 3 | | | 21 |
| Total for sector | 28 569 | 3 819 | 1 228 | 294 772 |

Figure 24. Sectoral investments by funding agency

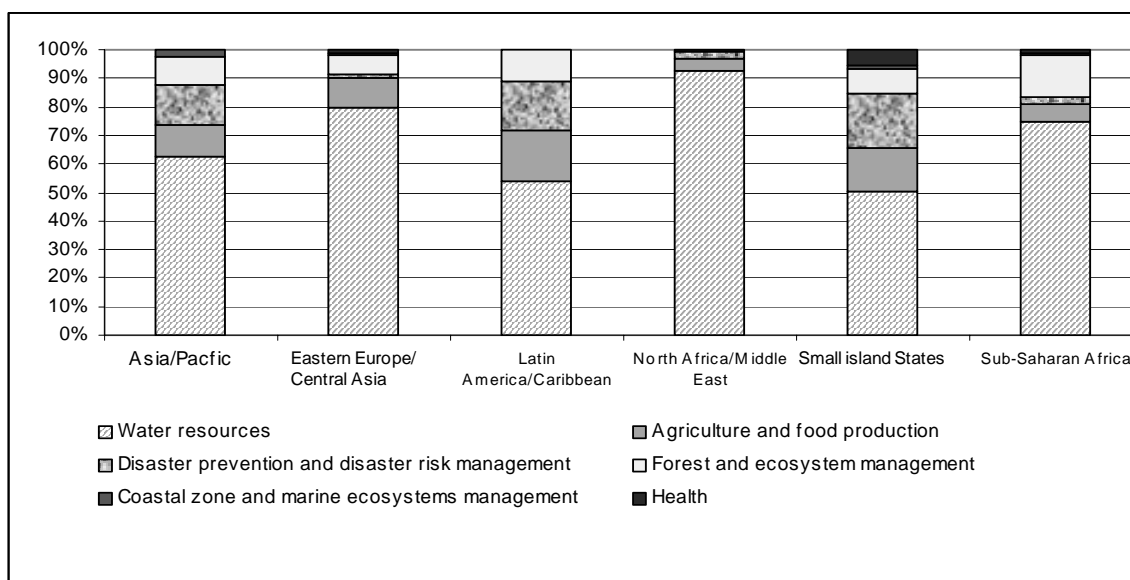


270. More detailed analysis of **investment by different sources by subsector for each of the sectors** relevant to adaptation provided in annex IV reveals some patterns. The investments in water resources differs substantially by institution. The World Bank, which makes up 97 per cent of the investment by international financial institutions in water resources, has more than half of its investment in municipal water supply, whereas most of the remaining investment in water resources made by the ADB went into integrated watershed management. Investment patterns in the agriculture and food production sector are broadly similar across all but one of the funding sources, in that a large majority of investments are directed to crop production. Five sources have investments in forest and ecosystem management projects, and the focus of these investments differ substantially. Whereas 75 per cent of investments by the World Bank were directed towards forest management, with most of the rest being devoted to protecting terrestrial ecosystems and biodiversity, the OPEC Fund focused almost exclusively on combating desertification and the NDF on forest management. Only four sources have invested in coastal zone and marine ecosystems management projects – the ADB, the OPEC Fund, the AfDB, and the World Bank – with the majority of investment in coastal development and infrastructure.³¹

3. Investment in climate sensitive sectors by region

271. In all of the seven regions, more than half of all infrastructure investment in climate sensitive sectors was directed toward water resources (figure 25). Investments in the SIDS and the Latin America and the Caribbean region were the most diverse, with most of the remaining investment portfolio being distributed among disaster prevention and risk management, agriculture and food production, and forest and ecosystem management. Investments in the Eastern Europe and Central Asia, and North Africa and Middle East regions were the least diverse, with almost 80 per cent and more than 90 per cent of investments, respectively, being devoted to water resources.

Figure 25. Investments in climate sensitive sectors by region



³¹ This sector is a good example of where it is difficult, without detailed examination of projects, to determine if investments decrease or increase vulnerability to climate change. If coastal infrastructure is built too close to the high-tide mark in low-lying coastal areas, it may increase vulnerability to sea-level rise or more intense coastal storms. If the investment allows for, or provides protection from, sea level-rise or more intense coastal storms, it may decrease vulnerability.

D. Lessons learned from investments relating to adaptation

272. **Similarities and differences across investment sources and in investment patterns** in infrastructure, technology and equipment relating to adaptation could be summarized as follows:

- The World Bank is by far the largest investment source in the sectors relevant to adaptation, followed by the ADB
- The largest percentages of investments tended to be in “hard” infrastructure projects, such as water supply, irrigation, and flood control projects
- The largest percentages of investments tended to be in sectors traditionally relating to economic development: water resources, agriculture and food production, forestry, and disaster prevention and risk management
- The smallest percentages of investments tended to be in the more complex, cross-cutting projects, such as those relating to health, coastal zone and marine ecosystems, integrated watershed management, and freshwater ecosystems and biodiversity
- The larger investment sources, the World Bank and the ADB in particular, tended to have more diverse investment portfolios in activities and projects relevant to adaptation
- The smaller investment sources, such as the WADB, the IADB, and the CABEI, tended to have a larger percentage of their investments in sectors not heavily emphasized by the larger institutions, such as agriculture, forest and ecosystem management, and health. This suggests some complementarity in their efforts and strong focus on priorities of the countries within the respective regions.

273. **On the lessons learned from the compilation exercise**, it is important to note that the approach adopted for this report in terms of the types of projects included had a substantial effect on the results and related analysis, which should be kept in mind. In particular:

- Many of the observed similarities may be attributed to the focus of this compilation on investments in infrastructure, technology and equipment. Many projects relating to ecosystems protection, health, and forest and integrated watershed management emphasized capacity-building and education, and thus were not included in the analysis. This is particularly evident for the health sector, where the total value of all World Bank health related projects undertaken between 1995 and 2005 amounted to more than USD 31 billion. However, less than 3 per cent of these projects, USD 821 million, could be identified as being directly related to infrastructure development;
- Many projects, particularly larger World Bank and ADB projects, contain multiple components. In many of these cases, only one aspect of the project may involve investment in infrastructure development. Those projects in which investments in infrastructure appeared to be only a small component of the project were not included in the analysis unless information was available regarding the value of that particular component;
- The various components of a project may also focus on several different sectors. For example, an agriculture project might include a crop production component, an irrigation component, and a watershed management component. If information was not available regarding the relative value of each component, the project was included in the sector and subsector that appeared to be the primary focus of the project. However, this may have caused some sectors to be overcounted and others undercounted;
- Detailed information regarding the focus and components of specific projects was often not available, precluding the inclusion of the project in the analysis. For example, none of the available project descriptions for the EADB contained sufficient detail to be included in the

analysis. About one third of the projects initially examined for the study were excluded from the analysis because information describing them was insufficient or they failed to meet the criteria set for inclusion.

274. Given the varying nature of the data compiled on investment needs by developing countries (qualitative data of areas of investment needs and illustrative examples of concrete projects) and the experience of the sources of investments covered by this report (highly aggregated quantitative information on projects and sectors related to adaptation) it is difficult to draw conclusions at this stage of the **relevance of experience of international funds and multilateral financial institutions to the investment needs of developing countries in the area of adaptation**. Also, as noted in paragraph 109, investment needs for adaptation show strong dependency on national circumstances. Yet, even at this stage, it could be noted that ensuring quality and quantity of water resources, together with relevant adaptation activities which represent a key focus of policy intervention in the context of adaptation for the majority of developing countries, is also a high priority for the financial institutions surveyed in this report. For example, 65 per cent of investments relevant to adaptation by the World Bank have been in water resources projects.

275. Other areas of investment needs relating to adaptation are covered by various investment sources to a different extent. Agriculture and food production forest and ecosystem management and disaster prevention and disaster risk management received almost equal shares (about 10 per cent each) of the overall investments. Coastal zone and marine ecosystems management, which is of particular relevance for SIDS, received small, but growing investments. The investments going into adaptation relating to human health are very small, but this rather reflects the focus of the report on infrastructure investments which, therefore, excludes capacity-building, feasibility studies and education on disease prevention, which could bring the overall estimates on investment in human health to a much higher level.

276. **On information gaps and further needs**, as noted in paragraph 264, the purpose of this compilation was to provide a broad overview of investments in developing countries by the MDBs to support projects, activities, and programmes associated with the development of infrastructure that can reduce vulnerability to the adverse impacts of climate change and enhance adaptation. It provides summary data on topic areas of investment, by institution and sector, and provides some observations regarding the nature of investment patterns in these topic areas.

277. This analysis was limited by a paucity of readily available information regarding the institutions considered for the report and the nature of their investments. In particular, additional information could be used regarding:

- Nature and dynamics of investment decision-making;
- Nature and components of investment projects;
- Details of funding levels and sources.

VII. Conclusions

278. The information compiled from the NCs suggests that developing countries, being guided by the principles of the Convention, such as eradication of poverty, avoiding risks to food production and sustainable development, **have taken some steps to address climate change in the context of their commitments under the Convention, in particular under Article 4.1 and have initiated the development of response strategies to climate change**.

279. Adaptation appeared as a critical response strategy to climate change for practically all developing countries. They have identified steps to facilitate adaptation first of all in the area of water resources, but also in the areas of agriculture, human health, forests and ecosystems management, and

coastal zone management and marine resources. Most developing countries have also identified steps to address mitigation as an important climate change strategy. The steps have been identified first of all in the area of energy and transport, but also in the areas of agriculture, LULUCF and waste management. Within the energy sector, these steps primarily focused on renewable energy and energy efficiency. It appeared difficult, from the information available from the NCs, to assess the magnitude of investment needs to implement adaptation and mitigation steps for individual developing countries and for the developing countries as a group. However, the examples provided for individual projects, activities and programmes suggest that **these needs are considerable**.

280. Given that the approach in compiling of information on experiences of financial institutions in this report was on breadth, rather than depth, and given the data gaps and inconsistencies identified, the results presented could be considered as preliminary ones. Yet, they allow some preliminary conclusions to be drawn on **the scope, pattern and trend in investments relating to mitigation and adaptation** provided through various investment sources.

281. On mitigation, it became clear that the **major financial flows relating to mitigation come from private sector sources**. However, they vary substantially with economic conditions, and centre primarily on growing middle-income developing countries. MDBs and ECAs, though, have major impacts on many infrastructure projects that have substantial implications for emissions and the potential for climate mitigation in developing countries. They have provided confidence for the private sector and leveraged substantial private investments for core mitigation projects and for sectors relevant to mitigation. They have also been a catalyst for fostering public–private partnerships and new funds, e.g. Prototype Carbon Fund. It is encouraging that the World Bank, which leads in terms of investment volume and diversity of project portfolio, is the most active in promoting both energy efficiency and renewable energy. Other banks, such as the EBRD and ADB, are also active in these areas. In addition, they have developed specialized lending programmes to specifically address climate change mitigation. The contribution by the ODA in supporting the mitigation effort in developing countries is also substantial and directed in many cases to countries that are not receiving much private investment.

282. It is also encouraging that several **MDBs have already gained substantial practical experience in all sectors sensitive to climate change that could be relevant to adaptation**, and have initiated programmes for mainstreaming adaptation into their projects. This reflects growing attention to adaptation in the recent years within the overall international climate policy agenda. Although the MDBs do not yet have any safeguards or technical standards relating to adaptation, this practical experience could help to shape the banks' policies to meet the growing needs for adaptation in a more efficient way.

283. The varying nature of the information available for compilation for this report on investment needs and on the relevant experiences of the multilateral financial institutions and international funds does not allow a definite conclusion to be drawn on the link between the needs and experiences. However, even at this stage it is apparent that investments were made in developing countries practically in all areas of mitigation and adaptation where needs have been identified. Moreover, some areas that appeared important as areas of investment needs, such as water resources (for adaptation) and energy and transport (for mitigation), seem to be within the focus of the financial institutions being surveyed and received the larger part of the investment flow.

284. **Future investment needs of developing countries to fulfil the commitments under the Convention are likely to grow** as the economies of developing countries continue to grow, especially for economies relying on fossil fuel, and the implementation of the Convention advances. They are also likely to grow in response to the need to support changes in technology, practices and planning that could reduce potential impacts from climate change. This poses a particular challenge for both Parties to the Convention and for financial institutions. In the context of mitigation, the analysis of the core mitigation and climate relevant investments suggests that they are part of and necessarily reflect other global

investment trends. Predictable frameworks – both generally for investments and specifically for carbon assets – and opportunities for growth appeared as key factors for private investors. In addition, deciding how to apply public funds both to help lever more private investment, as well as to address areas where private funds are not likely to go, appeared as the key questions for public investors. In the context of adaptation, given the focus of the report on public investors, increased attention to potential issues relating to adaptation that may arise in ongoing project design and implementation activities could help to facilitate adaptation in developing countries. Also, increasing of the scope and coverage of existing programmes for adaptation, and channelling investments into new such programmes, could contribute to this goal.

285. Given that the report provides only preliminary results, further work on investment needs of developing countries and relevant experiences of the multilateral financial institutions could encompass improving data collection and reporting. It could also encompass increasing the scope of the current compilation and the depth of the analysis. Possible areas for further work on data reporting and collection include the following:

- Annex I Parties could further improve the quality, transparency and completeness of information reported on the multilateral and bilateral sources of investments, such as MDB, ODA, ECA and private sector
- Non-Annex I Parties could improve further the quality, transparency and completeness of information reported in the NCs on the steps taken in implementing their commitments under the Convention and could report on the relevant investment needs
- Capacity of developing countries to better assess the investment needs relating to commitments under the Convention, including for adaptation and mitigation, could be further enhanced, e.g. from sources such as the GEF
- The MDBs, in particular the World Bank, could use a more consistent reporting format and a central database for investments
- Consideration of climate mitigation and adaptation could become an element of the ongoing efforts to improve and standardize environmental impact reporting among ECAs and MDBs
- The use of climate-change-related markers for mitigation could be expanded to include such markers for adaptation for investments in developing countries reported to the OECD, such as ODA.

286. As reiterated in this report, results from this compilation of information could be considered as very preliminary and further research could be undertaken to extend the scope of the compilation to cover more institutions, for which information was not easily available in the course of preparation of the report, and to go more deeply looking into large-scale projects to identify within the climate relevant investments the direction, positive or negative, and the magnitude of their effect on climate mitigation and adaptation. Such research could examine further the nature of and similarities among investment patterns. For specific groups of investors it could help to examine to what extent investment flows are consistent with the investment needs of developing countries and their commitments under the Convention in the area of adaptation and mitigation.

Annex I

Definitions used in the report

1. In the part on mitigation, the report covers investments in the form of **grants, loans and equity investments**, particularly where they are provided to projects or activities that lead directly to, or increase the commercial demand for, reductions in greenhouse gas (GHG) emissions in developing countries; or for which the primary purpose is to create the conditions for attracting such investments. This definition of investment does not include a number of other areas with relevance to climate change. First, investment-related insurance (such as that provided by ECAs) and guarantees (such as those provided by MIGA within the World Bank) are not included, although their availability has a major impact on private investment flows. Second, venture capital or portfolio equity investments in companies that produce goods or services that may be used to reduce emissions of GHGs are also not included (beyond the listing of some such firms in annex II), although their activities may well be reflected in the data for carbon, infrastructure/environmental investments. Finally, investments in companies establishing exchanges or other platforms solely for trading emission reduction credits are not included, whereas those established to purchase and hold such credits are included.
2. In the part on adaptation, the report covers investments in the form of **grants, loans and equity investments**, relevant to adaptation in climate sensitive sectors.
3. **Investments** represents financing for projects or activities associated with the development of infrastructure, technology and equipment.
4. **Grants** are investments provided mostly by public agencies or private charities that do not need to be paid back in cash.¹ Only grants from public agencies – primarily in the form of Official Development Assistance (ODA) – are considered in this report.
5. **Loans** are investments for which both the amount of the loan (the principal) and a return on the loan (interest) must be repaid over time. Loans can be made by both public and private institutions, for short (bank lending) and long (bonds) periods of time. Medium- to long-term loans made in support of infrastructure and similar projects are the primary focus of this report.
6. **Equity investments** represent partial ownership of the company receiving the investment and entitle the investor to a portion of the profits, as well as a say in how the business is run. Such investments are made by public and private institutions, in privately held (venture capital, foreign direct investment) or publicly traded (portfolio equity investment) ownership shares. Equity stakes in infrastructure project development companies or privatized government companies are the primary equity investments considered in this report.²
7. **Infrastructure** comprises basic equipment, utilities, productive enterprises, buildings, installations, technology, and services essential for the development, operation, and growth of an organization, city, or nation. In the text it is referred to as **infrastructure, technology and equipment**.

¹ But which usually come with a variety of other conditions imposed by the donor.

² The largest type of private investment flowing to developing countries is foreign direct investment, outside of the state privatizations, but it usually involves the application of retained earnings to the purchase of privately held shares or land, making detailed data on locations and sectors difficult to aggregate at a global level (Gentry, 1998). It is even more difficult to trace the impacts of portfolio equity investments on emissions of greenhouse gases (GHGs), although there have been some recent examples of companies floated in the London markets whose sole business is providing or trading GHG credits.

8. **Investment sources** are institutions providing financial support (i.e. investments) for projects or activities associated with the development of infrastructure, technology and equipment. These include multilateral sources (multilateral development banks (MDBs) such as the World Bank and the regional development banks, multilateral development institutions (MDIs), multilateral financial institutions (MFIs), and international funds); bilateral sources (ODA and export credit agencies (ECA)); and carbon and private infrastructure investors.
9. **Adaptation** is an adjustment in natural or human systems in response to or anticipation of actual or expected climatic stimuli or their effects.
10. **Mitigation** is an anthropogenic intervention to reduce the sources or enhance the sinks of greenhouse gases.

Annex II

Investment sources included in the compilation of experiences of international funds and multilateral financial institutions relevant to climate change mitigation in developing countries

International funds and multilateral financial institutions surveyed for investments in climate mitigation:

World Bank Group (IDB/IBRD, IFC, MIGA), Washington, D.C.
 Andean Development Corporation (CAF), Caracas, Venezuela
 Caribbean Development Bank (CDB), Barbados, West Indies
 Central American Bank for Economic Integration (CABEI), Tegucigalpa, Honduras
 Inter-American Development Bank (IADB), including the Inter-American Investment Corporation, Washington, D.C.
 European Bank for Reconstruction and Development (EBRD), London, United Kingdom
 European Investment Bank (EIB), Luxembourg
 Nordic Investment Bank (NIB), Helsinki, Finland
 Nordic Development Fund (NDF), Helsinki, Finland
 OPEC Fund for International Development (OPEC Fund), Vienna, Austria
 Black Sea Trade and Development Bank, Thessaloniki, Greece
 African Development Bank, Tunis, Tunisia
 Development Bank of Southern Africa (DBSA), Midrand, South Africa
 East African Development Bank (EADB), Kampala, Uganda
 West African Development Bank (WADB), Lomé, Togo
 Arab Fund for Social and Economic Development (AFSED), Safat, Kuwait
 Islamic Development Bank (ISDB), Jeddah, Saudi Arabia
 Asian Development Bank (ADB), Manila, Philippines

Agencies for official development assistance surveyed for investments in climate mitigation¹

Australia: AusAid
 Austria: Foreign Ministry
 Belgium: Development Cooperation (DGDC)
 Technical Cooperation (BTC)
 Canada: Canadian International Development Agency (CIDA)
 Denmark: Ministry of Foreign Affairs
 European Commission: DG Development
 Finland: Department for International Development Co-operation
 France: Department for International Co-operation
 Le Groupe de l'Agence française de Développement (Afd)
 Germany: Ministry for Economic Cooperation and Development (BMZ)
 German Development Bank (KfW)
 German society for technical cooperation (GTZ)
 Greece: Ministry of Foreign Affairs
 Ireland: Department of Foreign Affairs
 Italy: Ministry of Foreign Affairs
 Japan: Ministry of Foreign Affairs (MOFA)

¹ Organisation for Economic Co-operation and Development <www.oecd.org>, accessed May 2005

Japan International Cooperation Agency (JICA)
Japan Bank for International Cooperation (JBIC)
Luxembourg: Lux-Development
Netherlands: Ministry of Foreign Affairs
NZAid
Norway: Ministry of Foreign Affairs
Norwegian Agency for Development Cooperation (NORAD)
Portugal: Ministry of Foreign Affairs
Portuguese Institute for Development Support
Spain: Spanish Agency for International Cooperation (AECI)
Sweden: Sida
Switzerland: Swiss Agency for Development and Cooperation (SDC)
United Kingdom: Department for International Development (DFID)
United States: United States Agency for International Development (USAID)

Export credit agencies surveyed for investments in climate mitigation

Australia: Export Finance and Insurance Corporation (EFIC)
Austria: Oesterreichische Kontrollbank AG (OeKB)
Belgium: Office National du Ducroire/Nationale Delcrederedienst (ONDD)
Canada: Export Development Canada (EDC)
Czech Republic: Export Guarantee and Insurance Corporation (EGAP)
Czech Export Bank
Denmark: Eksport Kredit Fonden (EKF)
Finland: Finnvera Oyj
FIDE Ltd.
France: Compagnie française d'Assurance pour le commerce extérieur (COFACE)
Direction des Relations Economiques Extérieures (Ministère de l'Economie) (DREE)
Germany: Euler Hermes
Greece: Export Credit Insurance Organization (ECIO)
Hungary: Hungarian Export Credit Insurance Ltd (MEHIB)
Hungarian Export-Import Bank
Italy: Sezione Speciale per l'Assicurazione del Credito all'Esportazione (SACE)
Japan: Nippon Export and Investment Insurance (NEXI)
Japan Bank for International Cooperation (JBIC)
Korea: Korea Export Insurance Corporation (KEIC)
The Export-Import Bank of Korea (KEXIM)
Luxembourg: Office du Ducroire (ODD)
Mexico: Banco Nacional de Comercio Exterior
Netherlands: Atradius
New Zealand: Export Credit Office (ECO)
Norway: The Norwegian Guarantee Institute for Export Credits (GIEK)
Poland: Korporacja Ubezpieczeń Kredytów (KUKE)
Portugal: Companhia de Seguro de Créditos
Slovak Republic: Export-Import Bank of the Slovak Republic (Eximbank SR)
Spain: Compañía Española de Seguros de Crédito a la Exportación
Secretaría de Estado de Comercio (Ministerio de Economía)
Sweden: Exportkreditnämnden (EKN)
Switzerland: Export Risk Guarantee (ERG)
Turkey: Export Credit Bank of Turkey (Türk Eximbank)
United Kingdom: Export Credits Guarantee Department (ECGD)

United States: Export-Import Bank of the United States (Ex-Im Bank)
Overseas Private Investment Corporation (OPIC)

**Sample list of major private investors in infrastructure and environmental projects
in Asia and the Pacific, Latin America and the Caribbean, and the North Africa and the
Middle East Regions**

- (a) Sample list of the major providers of debt finance to infrastructure (power, transport, water/other) projects in 2004:²

AMP (power)
Arab Bank (power)
Arab National Bank (power)
Banco Santander Central Hispano (power)
BBVA (power, transport)
Banque Saudi Fransi (power)
BNP Paribas (power)
Citigroup (transport)
Commonwealth Bank of Australia (transport)
Grupo Financiero Banorte (transport)
HSBC (power)
Kookmin Bank (transport)
Samsung Group (transport)
Saudi American Bank (power)
United Overseas Bank (power)
WestLB (power)
Westpac Banking Group (transport)

- (b) Sample, major providers of equity finance to infrastructure projects in 2004:²

Acciona (transport)
AES Corporation (power)
Alinta Finance (power)
Australian Gas Light (power)
CMS Energy Corporation (power)
Commonwealth Bank of Australia (power)
Daelim Industrial Corporation. (transport)
Endesa (power)
ENEL (power)
Energias de Portugal (power)
Grupo Ferrovial (transport)
Gulf Electric Corporation (power)
Hyundai Corporation (transport)
Ingenieros Civiles Asociados (power)
International Power (power)

² 2004 “League Tables” published in *Project Finance*, April 2005. For purposes of this list, the private firms included in the top five providers across the power, transport and water/other sectors in the Asia and the Pacific, Latin America and the Caribbean and North Africa and the Middle East regions for 2004 are included as examples. Publicly owned organizations (such as the Korean Development Bank or BNDES in Brazil, are not included).

Macquarie Bank (transport)
Motor Trades Association of Australia (transport)
Obrascon Huarte Lain (transport)
Sacyr Vallehermoso (transport)
Saudi Oger (power)
Suez (power)
Thiess (transport)
Tokyo Electric Power Co (power)

(c) Examples of investors in climate related environmental projects in developing countries:³

ASC – Energy Finance
BASF Venture Capital
Blue Hill Partners
Capital Equity Partners
China Environment Fund
Conduit Ventures Fund
E & Co.
Energy Ventures Group
Gencoa/Simplicity Energy Farms Inc.
Global Environment Fund
Good Energies Inc.
India Renewable Energy Enterprise Development Fund
Jane Capital Partners LLC
New Energies Invest AG (Bank Sarasin + Cie)
New Energy Fund LP
OCM/GFI Power Opportunities Fund
Oikocredit
Private Energy Market Fund LP
Rabo Sustainability Fund
Robeco Milieu Technologie
Renewable Energy Equity Fund, Australia
Solar Century
Soluz
Sustainable Energy Ventures
Swiss Re
Triodos Renewable Energy for Development Fund
UBS (Lux) Equity Fund Future Energy
Vencon Management, Inc.
Verde Ventures, Conservation International
Warburg Pincus

³ The sample companies included in this list are drawn from the *Sustainable Energy Finance Directory* maintained by United Nations Environment Programme and the Basel Agency for Sustainable Energy <<http://www.sef-directory.net/>>. No effort has been made to verify the information included in the entries placed by the companies in that directory.

Annex III**Criteria to compile information on adaptation projects**

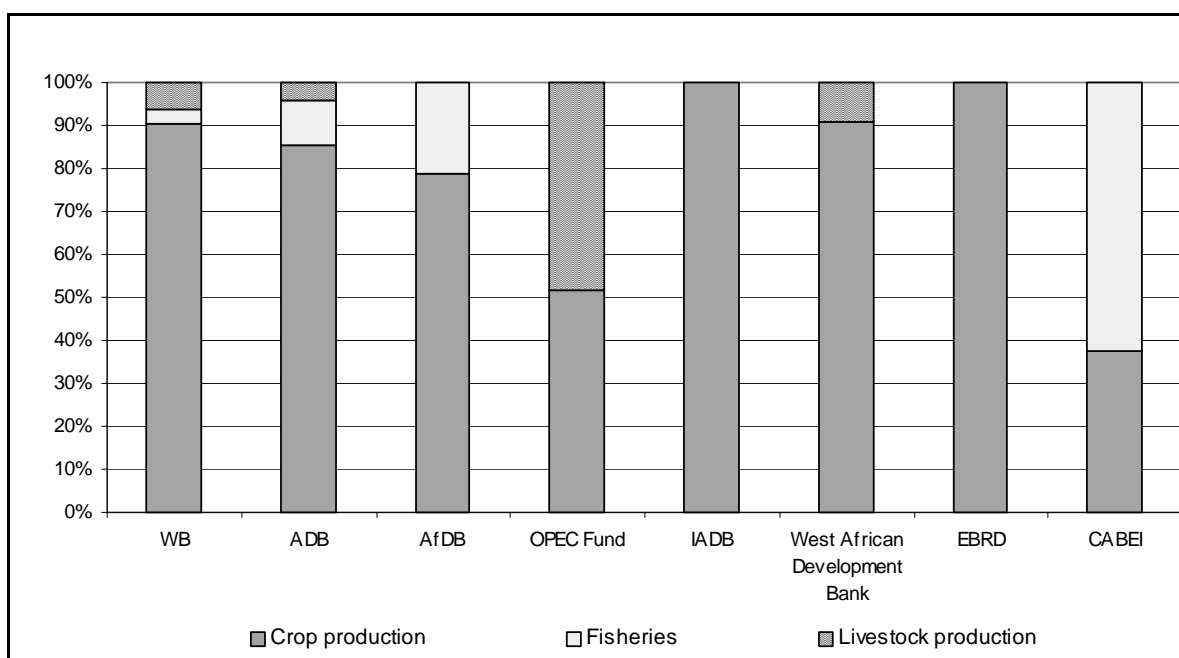
| Sector: Subsector | Project inclusion criteria |
|--|---|
| Water resources: irrigation water demand | Includes investments for which the primary purpose is the establishment, improvement, and rehabilitation of irrigation facilities and infrastructure |
| Water resources: municipal/rural water supply | Includes investments for which the primary purpose is to provide, extend, rehabilitate, or improve water supply infrastructure. Does not include drainage or waste-water treatment projects unless improvements to water supply infrastructure is specifically included as a major component of the project |
| Water resources: integrated watershed management | Includes the acquisition of equipment and supplies necessary to develop and manage integrated watershed management efforts. Also includes establishment of waste-water treatment facilities and other infrastructure as well as protected areas when done in the context of an integrated watershed management plan |
| Agriculture and food production: crop production | Includes investments in farm equipment, technology, seed distribution and other systems, as well as grants and other financial assistance to farmers to purchase equipment, land, and other infrastructure. Also includes improvements and rehabilitation of equipment, land, and infrastructure. Does not include irrigation systems unless they appear to be only a small component of the larger project |
| Agriculture and food production: Livestock production | Includes improvements to livestock production and marketing facilities; livestock purchases and replacement; milk production; purchases of equipment and other infrastructure; introduction and development of alternative livestock resources (e.g., silkworms) |
| Agriculture and food production: Fisheries | Includes development of inland fisheries and aquaculture; improvements to fleets, equipment, and other infrastructure; water hyacinth control; grants and other financing for production and marketing facilities and infrastructure |
| Disaster prevention and risk management | Includes the construction of flood control dams, dikes, and other flood control measures, as well as equipment and supplies for disaster management and prevention planning, early warning systems, etc. Also includes erosion control measures, tree planting, etc., when undertaken to stabilize mudslide-prone areas, as well as wetland protection measures when undertaken to control flooding. Includes drought mitigation measures, infrastructure, and equipment (e.g., drilling wells, rebuilding irrigation systems, etc.) when done specifically in the context of mitigating drought conditions in non-arid regions |
| Coastal and marine ecosystems management: coastal development and infrastructure | Establishment, rehabilitation, and improvements to coastal infrastructure, including embankments, sea walls, anchorages, harbour facilities, etc. Also includes the management and protection of forests and other terrestrial ecosystems when they are undertaken in the context of coastal development |
| Coastal and marine ecosystems management: coastal and marine ecosystems | Establishment and development of marine protected areas; coral reef rehabilitation and improvement; acquisition of research, monitoring, and other equipment and infrastructure |
| Forest and ecosystems management: forest management (including forestry) | Includes the establishment and improvement of forests and tree plantations for the purposes of improving their commercial viability, as well as the equipment and other infrastructure needed to develop, improve, or rehabilitate forests and tree plantations. Also includes equipment and infrastructure necessary to extract and process tree and forest products |
| Forest and ecosystems management: terrestrial ecosystems and biodiversity | Includes the establishment and maintenance of protected areas and the management of terrestrial ecosystems for the purposes of protecting biodiversity. Also includes the acquisition of monitoring and other scientific equipment |
| Forest and ecosystems management: freshwater ecosystems and biodiversity | Includes the establishment, rehabilitation, and improvement of infrastructure needed to protect freshwater resources, including water quality. Also includes the establishment of protected areas in wetlands, rivers, etc., as well as the acquisition of monitoring and other scientific equipment |
| Forest and ecosystems management: desertification | Includes drought mitigation measures, infrastructure, and equipment (e.g., drilling wells, rebuilding irrigation systems, etc.) when done specifically in the context of mitigating drought conditions in arid regions |
| Health | Includes the establishment, rehabilitation, and improvement of hospitals, clinics, and other infrastructure needed to protect public health. Includes the acquisition of drugs and medical equipment, as well as technologies necessary to establish public health surveillance systems, etc. Includes the rehabilitation and improvement of housing, public facilities, and other infrastructure when undertaken specifically to protect human health |

Annex IV

Investment by financial sources relating to adaptation by subsector for climate sensitive sectors

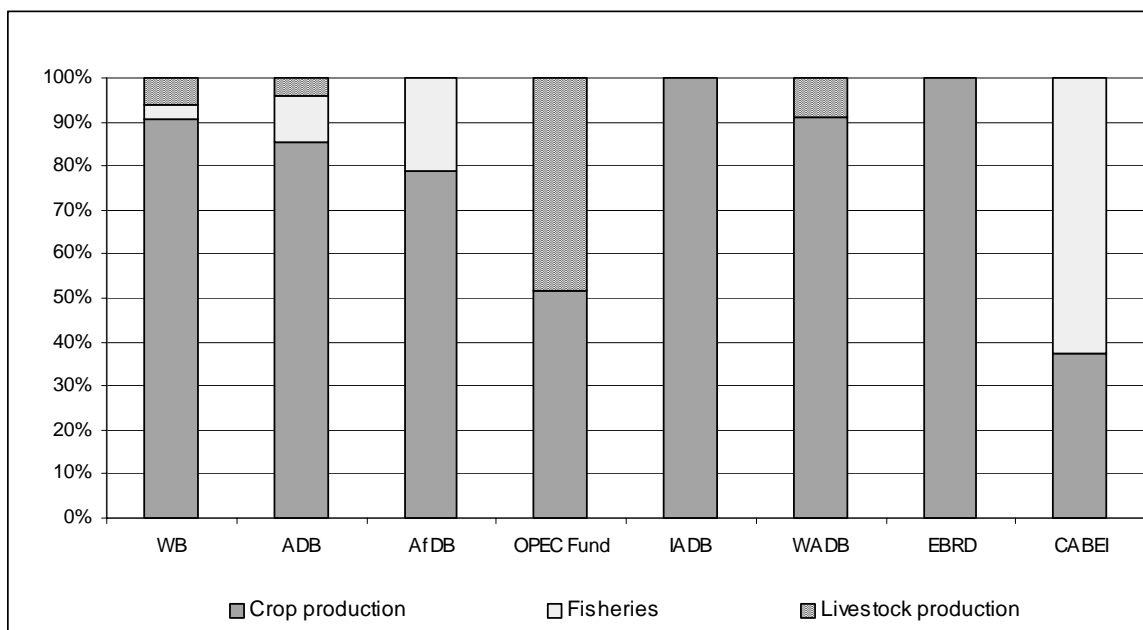
1. More detailed analysis of investment by different sources by subsector for each of the sectors relevant to adaptation reveals some patterns. The investments in water resources differ substantially by institution (figure A1). The World Bank, which provides 97 per cent of the investment by international financial institutions in water resources, has over half of its investment in municipal water supply. Most of the remaining investment in water resources infrastructure is by the Asian Development Bank (ADB) and most of its investment goes to integrated watershed management. The Inter-American Development Bank (IADB) and the Central American Bank for Economic Integration (CABEI) are mostly or completely invested in irrigation. The remaining institutions have the plurality (OPEC), majority African Development Bank (AfDB, WADB), or all Nordic Development Fund (NDF) invested in municipal water supply.

Figure A1. Investments in projects in water resources



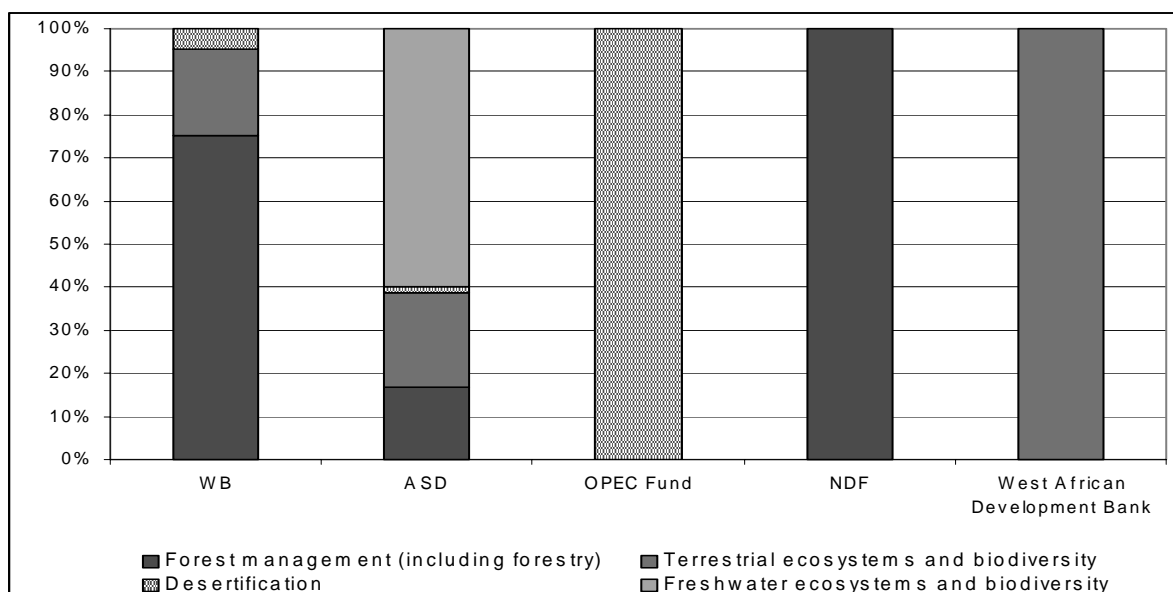
2. Investment patterns regarding the agriculture and food production sector are similar across all but one of the funding sources, in that a large majority of investment funds are devoted to crop production (figure A2). Although five of the funding sources have investments in livestock production, only the OPEC Fund has invested substantially in this sector, the project value of its investments being only slightly less than 50 per cent of the total project value. Only four of the eight investment sources have invested in fisheries projects, with CABEI investing all of its agriculture resources in fisheries.

Figure A2. Investments in projects in agriculture and food production



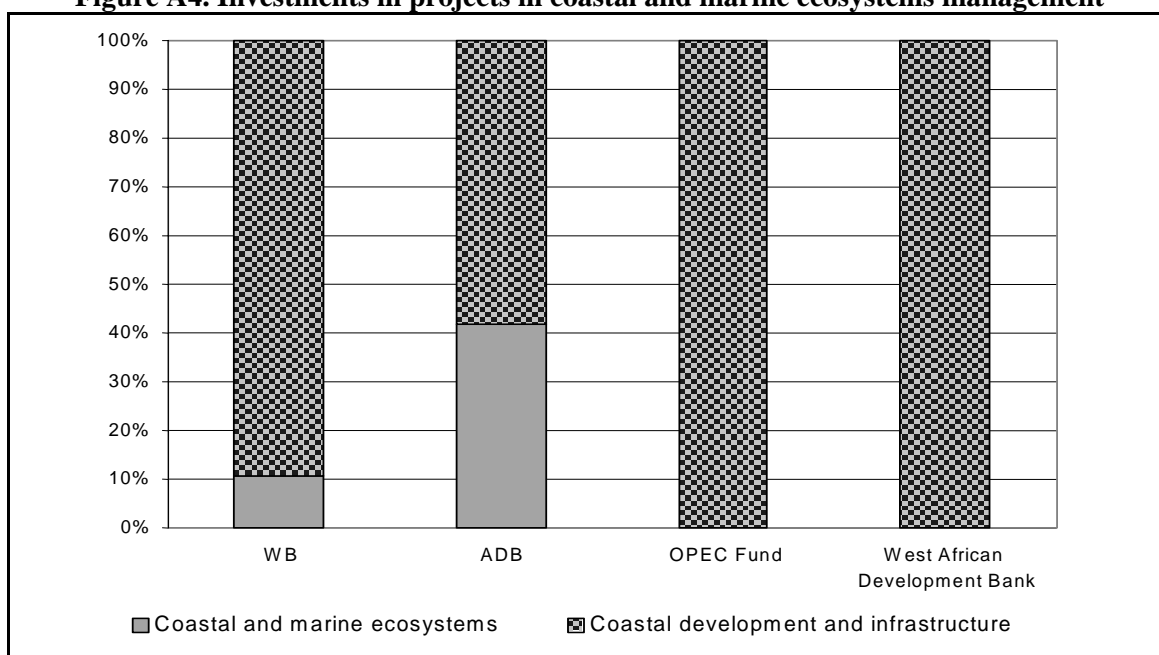
3. Five funding sources have investments in forest and ecosystem management projects (figure A3), and the focus of these investments differs substantially. Seventy-five per cent of investments by the World Bank were directed towards forest management, with most of the rest being devoted to protecting terrestrial ecosystems and biodiversity. However, less than 20 per cent of the value of projects supported by the ADB was directed towards forest management, and 60 per cent was devoted to freshwater resources. The OPEC Fund focused its investments on combating desertification, whereas the Nordic Development Fund focused on forest management. Finally, the West African Development Fund directed its investments in this sector towards the protection of terrestrial ecosystems and biodiversity.

Figure A3. Investments in projects in forest and ecosystem management



4. Only four funding sources have invested in coastal zone and marine ecosystems management projects: the ADB, the OPEC Fund, the AfDB, and the World Bank (figure A4). The majority of funding was in coastal development and infrastructure.¹ Only the World Bank and the ADB have invested in protecting coastal and marine ecosystems. Coastal and marine ecosystems projects are slightly more than 40 per cent of the value of ADB projects in this sector, whereas those of the World Bank are only about 10 per cent of the total project value.

Figure A4. Investments in projects in coastal and marine ecosystems management



¹ This sector is a good example of where it is difficult, without detailed examination of projects, to determine if investments decrease or increase vulnerability to climate change. If coastal infrastructure is built too close to the high-tide mark in low-lying coastal areas, it may increase vulnerability to sea-level rise or more intense coastal storms. If the investment allows for or provides protection from sea-level rise or more intense coastal storms, it may decrease vulnerability.

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