Post-Disaster Rehabilitation:

The Experience of the Asian Development Bank

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1. Introduction

1. The Asia-Pacific region is subject to about 60% of major natural disasters worldwide, resulting in losses of US$5-10bn per annum and enormous human suffering. Between 1972 and 1996, an average 127 million people in Asia and Oceania were affected by natural and technological disasters each year whilst slightly over 46,000 people were killed, 55,000 injured and 4.2 million made homeless (IFRC, 1998).

2. Disasters can also have potentially serious economic implications, both for individual households and national economies. For example, they can result in widescale damage to infrastructure, productive assets and crops. They can also create severe budgetary and balance-of-payments difficulties. At a more micro-level, hazard vulnerability and poverty are mutually reinforcing and poorer households are particularly vulnerable to hazards.

3. The Asian Development Bank (ADB) has extended a number of loans in the area of disaster mitigation and post-disaster rehabilitation, together totaling over US$2bn. During the International Decade for Natural Disaster Reduction (IDNDR), the Bank has also participated in several major conferences - namely, the 1991 meeting in

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Note: The views expressed in this paper are those of the authors and do not necessarily reflect the view of the Asian Development Bank.

Bangkok on *Natural Disaster Reduction in Asia and the Pacific: Launching the International Decade for Natural Disaster Reduction* and the 1994 mid-decade *World Conference on Natural Disaster Reduction* in Yokohama. This latest meeting provides another opportunity to share some information about the Bank's disaster-related activities and experience and to discuss it with stakeholders. Indeed, the timing of the meeting is particularly opportune as the Bank is currently completing a review of its post-disaster rehabilitation assistance

4. This paper is based on the findings of that review, the first major review undertaken in this area by the Bank since 1989.[1] The review was motivated by a number of factors including that relatively few of the Bank's post-disaster rehabilitation assistance projects had been postevaluated; that lessons learned from such projects had not been taken into account in related guidelines and policy; and that since the formulation of existing Bank disaster-related policy and lending instruments there had been a number of developments and changes in the incidence and nature of disasters in the region, in the emphasis of disaster management and in the related institutional arena.

5. The recommendations arising from the review and related consultations with various stakeholders in the region are expected to lead to a revision of the Bank's guidelines and, possibly, policy with regard to disasters. This current paper and associated discussions over the duration of this IDNDR Regional Meeting for Asia also form part of this on-going consultative process. As such, the Bank would like to encourage feedback and comments, particularly on its future role in the areas of both post-disaster rehabilitation and prevention, mitigation and preparedness.

6. The remainder of this paper is divided into four main sections. The first provides an overview of the Bank's disaster-related activities, including their historical context. This is followed by an account of lessons learned by the Bank in supporting post-disaster rehabilitation activities. The succeeding section focuses on information constraints in appraising and formulating disaster rehabilitation and mitigation projects. The final section outlines some of the new challenges emerging as various factors combine to influence the scale and frequency of disasters. It also considers how the Bank could adjust its own policies and practices, and also support other stakeholders, in responding to these challenges. The paper ends with a few brief concluding comments.

2. Overview of the Bank's disaster-related activities

A. Historical Overview

7. Until the mid-1980s, the Bank's disaster-related activities were predominantly in the form of largescale mitigation projects. These frequently entailed heavy engineering projects and were financed through the Bank's normal lending procedures (Hecker, 1994). Although the Bank has had no formal policy as such on this type of assistance, it continues to provide mitigation loans intermittently, as indicated below.

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[1] The review will be completed in 1999.

8. Some post-disaster reconstruction activities were also undertaken, either under existing projects or through the approval of new ones. However, such loans were again financed through the Bank's normal lending instruments. These facilities involve fairly lengthy loan approval procedures which take some time to complete, effectively inhibiting the provision of rapid assistance and reducing the potential benefits of the loans in a post-disaster context.

9. In order to facilitate a more rapid response, the first of two new disaster lending facilities, *Rehabilitation Assistance to Small DMCs Affected by Natural Disasters* (Operations Manual (OM) Section 25), was created in 1987. The establishment of such a facility specifically for small developing member countries (DMCs) reflected the potentially severe economic impacts of disasters in such countries, including the possible destruction of a significant part of the infrastructure and capital assets of the affected country.

10. The new facility was specifically intended for use in rehabilitation, rather than longer-term reconstruction, activities. It was intended to provide timely assistance to re-establish the *status quo ante*, leaving any more substantial expansion or modernization efforts for consideration under subsequent loan proposals. As such, the restoration work was intended to be of a simple nature; should not involve detailed new design and technical work; should not exceed US$0.5m in cost; and should be completed within a 12-month period. Assistance was confined to infrastructure repair and replacement of equipment in the water, sewerage, power, transportation, communications, health, education and basic production sectors. The ceiling on the size of loans was subsequently increased to US$2m in 1997.

11. The second facility, *Rehabilitation Assistance After Disasters* (OM Section 26), was created in 1989. Its basic sentiment and indicated scope of use were the same as those under the first facility. However, it differed in a number of ways including that no limit was set on the size of loans; that projects could be implemented in a period of up to three, rather than one, years; that the loan facility could be used in response to disasters caused by human action, such as civil strife, as well as natural disasters; and that rehabilitation projects could include basic improvements, with due regard to be given to technological advances, changed requirements and disaster mitigation.

12. The two facilities were subsequently revised in 1995, as part of a more general Bank process to divide its Operations Manual into two sections - Policies and Operational Procedures. During this process OM Section 25 became OM Section 24 and OM Section 26 became OM Section 25. However, the two facilities remained essentially unchanged. For the sake of consistency, the two policies are referred to by their newer numbers in the remainder of this paper.

13. Both facilities were justified on the basis of the fact that, as a multilateral agency, the Bank has a role to play in responding to disasters which threatened to interrupt, or were prejudicial to, economic growth and development in its DMCs. The Bank does not provide immediate post-disaster humanitarian assistance as it considers that other donors and nongovernment organizations (NGOs) are better placed to offer such assistance.

B. Organizational Arrangements

14. Operational divisions in the Bank are responsible for designing and implementing rehabilitation assistance loans in response to particular disaster events. They are also responsible for incorporating disaster mitigation features into other projects, as relevant.

15. Operational divisions are supported in such activities by the Bank's disaster mitigation focal point. The role and location of the focal point is presently being reviewed.

C. Disaster-Related Lending

16. Since 1987, when OM Section 24 was first created, six rehabilitation assistance loans totaling US$3.6m (at real 1997 prices) have been approved for small DMCs (Table 1). An additional 20 loans, totaling US$979m (at real 1997 prices), have been extended to other DMCs, including three loans approved prior to the creation of OM Section 25. A further US$9.7m loan (at real 1997 prices) has been extended under OM Section 25 to Western Samoa, a small DMC. In theory, rehabilitation assistance loans can be made from both Ordinary Capital Resources (OCR) and Asian Development Fund (ADF) resources but in reality have only drawn on the latter.

17. The total level of new rehabilitation assistance lending has varied considerably between years (Figure 1). No new loans were extended in 1995 whilst the highest level of loans - totaling US$257m (at real 1997 prices) or 19.8% of total annual ADF lending for that year - was approved in 1992. Between 1988 and 1998, rehabilitation assistance loans accounted for 5.6% of total ADF loan approvals and for 1.5% of ADF and OCR loan approvals combined.

18. The relative allocation of loans between different types of disaster is indicated in Figure 2. Floods alone have accounted for just over half - 51% or US$498m - of total rehabilitation assistance loans approved between 1987 and 1998. Earthquakes and civil unrest have accounted for a further 30%.

19. In terms of geographical distribution, Bangladesh has been the single most important recipient (Figure 3). This country accounted for 38% of total new rehabilitation assistance lending between 1987 and 1998. The Philippines received a further 23% and Pakistan 17%.

20. The Bank has also extended at least eight ADF and six OCR loans entailing major disaster mitigation components under its normal lending facilities (Table 2).[2] These loans have totaled US$1,042m (at real 1997 prices), with the earliest such loan dating back to 1972. All related to floods. Other projects have also incorporated certain disaster mitigation features. One estimate suggests that perhaps five to six projects approved each year contain a flood protection component whilst others incorporate appropriate disaster-proofing measures into the design of infrastructure.

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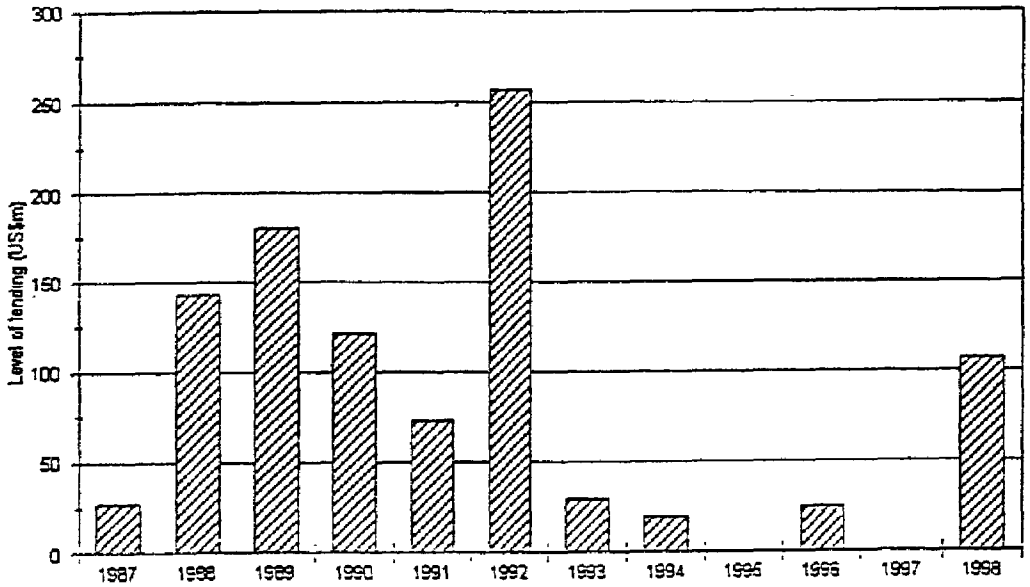
[2] There are certain difficulties in identifying Bank loans in the related area of disaster prevention and mitigation as the Bank does not report such activities as a separate category of lending.

Figure 1: Annual Level of Emergency Rehabilitation Assistance Loan Approvals, 1987-1998 (at real 1997 prices)



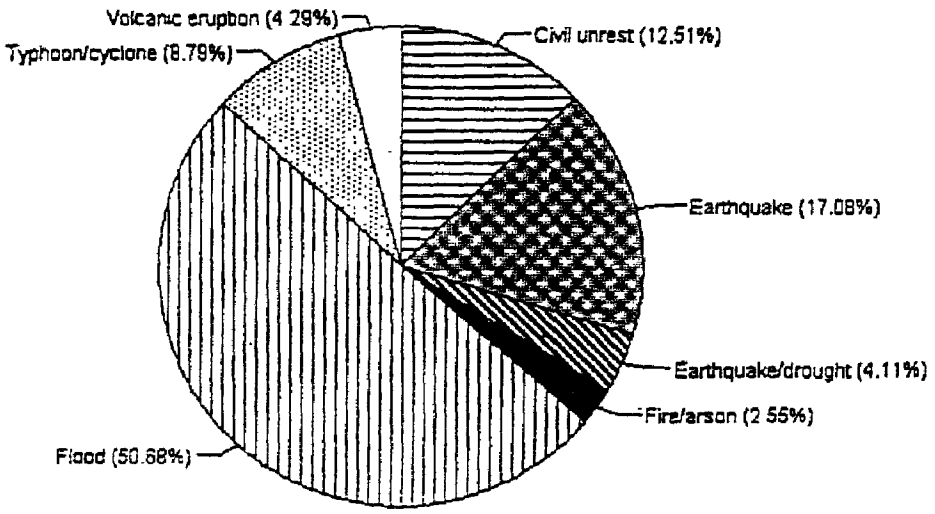
21. Finally, there have been at least 31 disaster-related technical assistance (TA) loans, including three regional ones. The latter, totaling US$1m (at real 1997 prices), have involved a regional study on disaster mitigation, a project supporting the institutional strengthening of the Asian Disaster Preparedness Center and activities relating to the 1994 *World Conference on Natural Disaster Reduction*. Under the first of these three loans, the Bank financed the production of two books, *Disaster Mitigation in Asia and the Pacific* (ADB, 1991a) and *Disaster Management: A Disaster Manager's Handbook* (ADB, 1991b). The books were published in 1991 and have been very well received by the disaster community both in Asia and the Pacific and beyond.

3. Lessons learned in supporting post-disaster rehabilitation activities

22. The review of Bank experience has indicated a number of ways in which the performance and effectiveness of rehabilitation assistance loans could be improved. Many of these findings are of wider relevance, both for national governments and other donors, in undertaking post-disaster rehabilitation efforts. Some of the findings are therefore presented below, both to enable others to learn from the Bank's experience and also to encourage comment and feedback in helping the Bank to overcome the difficulties that it has encountered.

23. **Mechanisms for reducing delays in the processing and administration of loans should be developed.** The length of time between the

Figure 2: Distribution of Emergency Rehabilitation Assistance Loans by Type of Disaster, 1987-1998



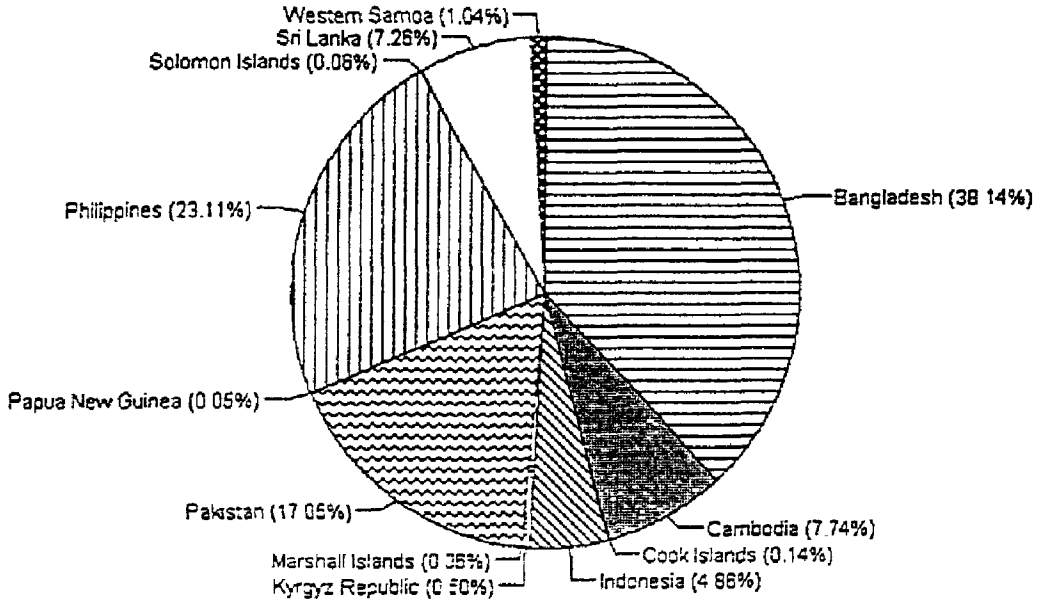
occurrence of a disaster and loan effectiveness has averaged some 21 weeks for loans approved under OM Section 24 and over a year for those approved under OM Section 25. Such delays have reflected problems in damage assessment; in the transmission of information on the scale of damage and related requirements; and in the timely issue of emergency relief acts.

24. Completion of many rehabilitation projects has also been significantly delayed, with projects on average taking almost twice as long to complete as originally envisaged. These delays have occurred for various reasons including weak institutional capacity and technical and managerial skill shortages in implementing agencies; delays in the procurement of project inputs; misunderstandings about procedures for the release of funds; and delays in the appointment of consultants.

25. Various ideas have been suggested to help such overcome delays, each involving some form of prior agreement or arrangement between the Bank and national governments. However, no such understanding has as yet been tried out, at least by the Bank.

26. **Mechanisms should be established to ensure that adequate and timely consulting services are built into projects.** Rehabilitation assistance projects can require more consulting services than other loans. This reflects both their urgency and the particularly acute problems of absorptive capacity as recipient governments have to cope with both the consequences of a disaster and additional disaster-related

Figure 3: Geographical Distribution of Emergency Rehabilitation Assistance Lending, 1987-1998



flows of assistance. However, although the Bank tries to ensure the expeditious recruitment of consultants, a number of the problems experienced in the implementation of such projects have been attributed to delays in the appointment of consultants, the failure to appoint sufficient consultancy time or the failure to utilize all the funding available for consulting components of a project. For example, the possibility of correcting deficiencies in subprojects supported under a flood rehabilitation assistance loan extended to Pakistan in 1989 was reported to be generally limited because many of the works had already been started or completed at the time the Consultant was, belatedly, mobilized.

27. **Piggy-backed technical assistance requirements should be assessed as a matter of course.** Currently, there is no particular rationale for use in determining whether or not Bank rehabilitation assistance loans should be accompanied by supporting technical assistance nor the scope of such assistance. Clear guidelines therefore need to be developed and routinely applied.

28. **Training requirements within the executing and implementing agencies should be assessed and appropriate provision made at relevant points in the project cycle.** A few rehabilitation assistance loans have included small components for the training of government staff but this is relatively rare. Moreover, insufficient attention has sometimes been paid to the timing of that training. For example, under an earthquake rehabilitation assistance loan extended to Indonesia in 1994, government staff were provided with training at the Asian Disaster Preparedness Center

(ADPC). However this training occurred towards the end of the period of loan implementation. The government staff concerned commented to ADPC trainers that had they received the training at the start of the rehabilitation process then they would have implemented the project differently.

29. **Mechanisms should be established to ensure the quality of work and sustainability of facilities.** Certain problems have been experienced relating to the quality of work undertaken and the more general maintenance of facilities supported under rehabilitation assistance loans. In some cases, such difficulties may have seriously reduced both the expected life of facilities and their capacity for withstanding further disasters. Moreover, a number of rehabilitation assistance projects have not included disaster mitigation components. Much greater attention therefore needs to be paid to these aspects of rehabilitation assistance. In order to ensure improved maintenance, for example, various measures could be introduced including the increased allocation of funds for this purpose; increased monitoring; training of relevant public agencies and end users; and greater public participation. In some cases, maintenance costs could also be recovered through user fees.

30. **Clearer guidelines on the frequency and nature of project reviews and monitoring arrangements should be established.** In order to ensure their rapid and smooth implementation, rehabilitation assistance loans often require considerable monitoring. A comparison of 16 such loans indicated, however, that the frequency of reviews over the period of loan effectiveness ranged between 21 and 74 weeks.

31. **During loan preparation, benchmark data should be established for use in the later review of project benefits and achievements.** Difficulties have been encountered in measuring the precise longer-term benefits of rehabilitation assistance loans. Reflecting the speed with which such loans are processed, project benefits have typically been defined in purely qualitative terms while detailed baseline studies have not been conducted. In those cases where economic internal rates of return (EIRR) have actually been estimated as one form of measurement of the benefits of a project, remaining physical structures which a project aims to rehabilitate have sometimes been treated as sunk cost. This has inflated the level of potential benefits. For example, the EIRRs were estimated at 60% and 18-29% in the case of two flood rehabilitation loans extended to Bangladesh in 1988, underlining the need for improved methodologies.

32. **There should be some mechanism for determining those circumstances under which it would be appropriate to incorporate greater consideration of environmental and social factors into the design and implementation of projects.** Most project documents relating to rehabilitation assistance loans have provided only a cursory assessment of the environmental impacts of a project, arguing that since the projects rehabilitate destroyed facilities they therefore have no environmental impact. In reality, however, there may have been considerable environmental changes in a particular area since major investment activities were last undertaken.

33. Similarly, little detailed analysis has been undertaken of the social dimensions of rehabilitation assistance loans; and in many cases there appears to have been little or no involvement of beneficiaries in the formulation of projects. A notable exception occurred in the context of the Flores earthquake, under which UNDP coordinated a rapid social survey as part of a broadly based multi-donor relief and

rehabilitation effort. There could be scope for further collaborative undertakings of this nature.

34. **Regular efforts should be undertaken to review and synthesize lessons learned during the processing and implementation of projects, not only within but also between countries and stakeholders.** In cases where several rehabilitation assistance loans have been extended to the same country, there is some evidence that lessons learned from previous loans have been drawn upon. For example, a rehabilitation loan extended to Indonesia in 1994 in response to the West Lampung earthquake took into account lessons learned in implementing the earlier Flores earthquake loan. In particular, it responded to the need identified for a Steering Committee empowered with a strong coordination role and decision-making authority at the local government level. However, there has been no more general effort to synthesize lessons learned, either across country or donors and national governments.

35. **Greater consideration needs to be paid as to how to support countries facing drought.** Although droughts can have significant macroeconomic and human impacts, only one rehabilitation assistance loan has been extended in response to this type of disaster. This pattern may partly reflect the emphasis placed by existing Bank rehabilitation assistance instruments on infrastructure rehabilitation rather than, for example, the restoration of livelihoods or levels of agricultural production. It may also reflect a wider tendency amongst donors and governments alike to treat drought primarily as a problem of food shortages whilst often ignoring its broader economic implications.

36. **The appropriate role of rehabilitation assistance loans needs to be carefully reassessed.** Finally, the Bank's review has raised some more fundamental questions concerning the appropriate role of rehabilitation assistance loans. The scope and emphasis of policies relating to such lending has been on the expeditious restoration of economic activity via the rehabilitation of essential infrastructure. In reality, however, rehabilitation assistance projects have varied in the extent to which they have improved as well as restored damaged physical infrastructure. Some projects have simply sought to replace like with like, others to incorporate disaster mitigation features into rehabilitated structures and others again to introduce further improvements. As a general principle, improvements which strengthen infrastructure against future disasters should be greatly encouraged. It may also be appropriate to re-design and modernize facilities, for example, to enhance operating efficiency. However, rehabilitation assistance loans may not be the correct funding mechanism by which to do so, particularly since they do not involve normal pre-investment appraisal procedures. The Bank's existing policy has also permitted the undertaking of several major multi-year reconstruction projects, two of which involved Bank loans of US$100m, although speedy restoration of basic economic activity may not be contingent on the completion of such projects. This again raises questions about the precise scope and objectives of the Bank's rehabilitation assistance lending.

4. Information constraints: the need for improved financial and economic analysis of the impact of disasters

37. An additional problem encountered, both by the Bank and others working in the broad area of disaster management, concerns the availability and quality of

information on the financial and economic impacts of disasters. This creates difficulties both in providing timely and appropriate post-disaster assistance and in demonstrating the benefits of prevention, mitigation and preparedness measures. Indeed, the currently limited understanding of the true scale and nature of the economic impacts of disasters may be one of the main factors inhibiting greater investment, both public and private, in disaster prevention and mitigation.

A. Data requirements

38. Four basic types of data on the economic and financial costs of disasters are required:-

(i) data on the overall cost of a disaster and the related relief and reconstruction activities, in order to ascertain the financial capability of the affected government to deal with the crisis and whether it needs to launch an international appeal;

(ii) more detailed data on the replacement cost of individual items of infrastructure and capital equipment for which funding is required;

(iii) data on the economic or present value of losses, providing information for use in the estimation of the economic rates of return to specific rehabilitation and mitigation measures; and

(iv) data on the broader economic impacts of disasters, as a basis for deciding whether hazard risk management should form a major concern of broader government and donor policies, strategies and operational activities.

B. Current assessment practices

39. A number of commentators have recognized the macroeconomic significance of disasters and the problems they pose for development, calling for wider adoption of prevention and mitigation measures (e.g., Anderson, 1991; Jovel, 1989; Otero and Marti, 1995). However, such acknowledgements have typically been made by those working within the field of disaster management and there is little wider appreciation of their potentially serious implications. Moreover, such sources provide little hard evidence in their support, essentially because there have been few detailed studies of the wider economic consequences of disasters.

40. Instead, most assessments of the economic impacts of disasters have concentrated on the most easily measured direct losses - that is, the cost of physical damage - drawing on information provided by post-disaster damage assessments. As such, they have generated, at best, only the first two categories of information indicated above. This emphasis reflects both particular, and entirely understandable, concerns to meet the short-term humanitarian needs of affected communities in the aftermath of a disaster and difficulties in analysing indirect and secondary impacts - such as damage to the flow of goods and services, changes in patterns of income distribution and the incidence of poverty or balance-of-payments and budgetary consequences.

41. Moreover, there are a number of problems commonly associated with post-disaster damage assessments, often making even estimates of direct losses incomplete and unreliable:-

(i) **Lack of comprehensive guidelines for use in estimating the costs of disasters** - Only very broad guidelines, if any, exist in many countries for assessing the impact of a disaster. Standard social science methods, such as sampling procedures, are also often ignored. Thus, even within a particular country, there may be internal inconsistencies in terms of the scope of coverage of assessments; the reporting format; and the methodology employed in valuing damage.

(ii) **Lack of training** - Damage assessments are commonly undertaken by officials and volunteers on the ground, often with little prior specialist training or perhaps even experience in general survey techniques. This adds to the uncertainty of accurateness of assessments, particularly where assessors are equipped with only very limited checklists or questionnaires.

(iii) **Non-comprehensive scope of coverage** - Damage assessments are typically undertaken by government agencies, perhaps undertaken in cooperation with or complemented by NGO or bilateral and multilateral donor assessments. These various bodies often have specific objectives of their own, generally orientated around rehabilitation efforts but reflecting their particular areas of interest. Thus, for example, individual government departments or agencies may be responsible for assessing damage to their respective areas of concern (agriculture, transport, housing and so forth) but damage to the private sector may be ignored. Damage which is not eligible for government assistance may also be left out. Certain types of damage can therefore go unrecorded in official reports while it can be difficult to reconcile the various partial assessments in order to provide an overall account of the physical and economic impact of a disaster. Indeed, it is not uncommon to see a wide range of estimates of the cost of the same disaster.

(iv) **Excessive rapidity of the assessment process** - Damage assessments are often completed in a very short period of time. As already indicated, their basic objective is commonly to provide essential information upon which appropriate and timely responses can be based, addressing both short-term humanitarian needs and longer-term relief and rehabilitation requirements. By definition, such assessments should therefore begin in the immediate aftermath of a disaster and, indeed, the first assessments are typically completed very rapidly, frequently within 7 days. However, although governments may prepare a subsequent report detailing relief and rehabilitation efforts, no further assessment of the longer-term economic impacts of a disaster is often formally required and so is only very rarely undertaken. Thus, by definition, post-disaster damage assessments can represent little more than stock-taking exercises, focusing on damage to buildings, infrastructure, capital equipment and standing crops. Meanwhile, they provide little evidence on the wider economic impacts of disasters or thus on the precise nature and scale of

a particular economy's, or community's, vulnerability. Despite this, the total cost of damage reported may be equated to the total economic cost of a disaster, effectively weakening the case for higher investment in disaster prevention and mitigation measures by excluding indirect and secondary costs.

42. Various cost-benefit analyses of individual disaster prevention and mitigation projects have also entailed efforts to estimate the economic impacts of natural disasters. However, once again, benefits have typically been defined in terms of tangible expected levels of production with and without the investment whilst indirect and secondary benefits and losses have been ignored. Similarly, pre-investment appraisals of other projects with potential indirect implications for the level and nature of hazard vulnerability should take account of disaster-related benefits and costs. In practice, however, this happens relatively rarely, again due to measurement difficulties.

43. A further bias in the existing body of evidence relates to the fact that the relatively few studies which have examined indirect and secondary impacts of disasters have largely focused on the impact of a particular disaster event, rather than the longer-term cumulative consequences of a series of disasters on a particular country's development. Yet, in reality, disasters are repeated rather than one-off events, striking a country at infrequent intervals over the course of time and collectively potentially affecting both the rate and pattern of development.

44. These biases and limitations have effectively limited the extent of information available to policy-makers on the nature and scale of a country's economic vulnerability to natural hazards. More fundamentally, they have been an important factor contributing to the widespread failure to address natural hazards as a potentially serious threat to sustainable development or to appreciate the potentially high economic and social returns to mitigation.

45. Thus, knowledge and understanding of the economic impacts of disasters clearly needs to be strengthened and economic tools of analysis increasingly applied to disaster-related issues. Such efforts should aim to improve both post-disaster damage assessments and economic analysis of investments in longer-term prevention and mitigation, building on work already being undertaken in this area. This requires a concerted and coordinated initiative on the part of national governments and the international donor and research community alike. The Bank welcomes advice on its most appropriate role within this process.

5 Future challenges in Asia

46. Finally, the Bank's rehabilitation assistance facilities, and its related activities in the area of disaster mitigation and prevention, need to be considered in a regional context. A number of new challenges are emerging as various factors influence the scale and frequency of disasters in Asia and the Pacific. In undertaking its review, the Bank is seeking to understand the implications of these changes in order that it can ensure that its disaster-related lending facilities and policies remain appropriate. The Bank is also seeking to enhance national, local and regional capacity disaster management capabilities.

A. Changes.in the scale and frequency of disasters

47. Factors influencing the scale and frequency of disasters include the following:-

(i) **Environmental degradation** - There is clear evidence that a number of countries are becoming increasingly vulnerable to natural hazards as a consequence of environmental degradation and increased cultivation and occupation of marginal lands. In particular, deforestation is contributing to the increased incidence of droughts, flash flooding and seawater intrusion.

(ii) **Urbanization** - Developing countries, particularly in Asia, have experienced rapid rates of urbanization over the past fifty years, associated with economic development, industrialization and high rates of population growth. Rapid urbanization has resulted in increased hazard vulnerability, particularly of poorer segments of society. This has occurred for a number of reasons, including high demand for land, forcing increasing occupation of marginal and more hazardous areas; environmental degradation, as surrounding areas are cleared for settlement; increased pressure on drainage systems; and, as indicated below, increased exposure to technological hazards.

(iii) **Industrialization** - The rapid, and often unplanned, process of industrialization which many Asian countries are experiencing has increased the risk of technological disasters as increasing numbers of human settlements and industrial complexes are located side by side.

(iv) **Devolution** - Several countries are undergoing a process of devolution. As part of this process, local governments are increasingly expected to meet some portion of disaster prevention and relief costs themselves and to rely on local human resources and equipment in managing and responding to disasters.

(v) **Poverty** - Natural hazards are one of the root causes of poverty whilst poverty, in turn, exacerbates hazard vulnerability. The links between the two are attributable not only to the damage, temporary loss of livelihoods and increased indebtedness associated with disasters but also to the types of decisions which poorer households may make as risk minimizers, rather than income maximizers. However, despite the increasing emphasis which both governments and the international community are placing on poverty alleviation, hazard vulnerability considerations have received relatively scant attention in anti-poverty strategies in many countries.

(vi) **Forest fires** - Thousands of fires in Indonesia in 1997 and 1998 resulted in serious atmospheric pollution in south-east Asia, with economic, social, health and environmental implications. Many of the fires were caused by the application of fire in landuse systems, although they were accelerated by a prolonged period of drought. As such, the fires and associated haze should not be viewed as an isolated, one-off event but, rather, as a

disaster which could potentially re-occur. Indeed, the Bank's two most recently approved disaster-related technical assistance loans are aimed at addressing precisely this issue.

(vii) **Global warming** - Finally, global warming could contribute to the increased incidence of natural hazards in the longer-term, although scientists are still debating the precise impact of changes in the composition of the atmosphere on the frequency and intensity of climatic hazards. Impacts are also expected to vary significantly between regions and sub-regions, contributing to the uncertainty and confusion about the likely implications of global warming.

48. It is clear from the above that changes in the incidence of disasters reflect changes in the scale and nature of household, community and national hazard vulnerability as well as changes in the frequency and intensity of hazards themselves. Indeed, with the exception of the longer-term consequences of global warming, changes in the incidence of disasters in recent years are largely attributable to socio-economic change and the impact of human activities on the environment.

49. As such, much could be done to prevent a rise in hazard vulnerability and it may be in this area - that is, disaster mitigation - that Bank policy and practice requires most adjustment if the Bank is to respond to the challenges posed by the changing nature of hazard vulnerability in the region. Currently, although the Bank has extended a number of loans wherein disaster mitigation is explicitly identified as a primary objective, hazard risk concerns are not considered as a matter of course in all Bank operations.

50. There are various ways in which the Bank could strengthen its operations in this regard. Disaster mitigation extends beyond structural measures to include an array of non-structural, essentially non-engineering options such as the reforestation of mountainous, coastal and upstream areas, land-use control and the cultivation of less hazard-vulnerable crops. Many of these practices could be incorporated into broader development projects. Indeed, hazard risks should perhaps be assessed as a matter of course in disaster-prone countries and the design of projects adjusted accordingly to incorporate appropriate prevention and mitigation measures. For example, environmental impact assessments could consider the hazard vulnerability implications of proposed projects. The planning and design of all urban projects, including housing schemes and infrastructure development, could also include detailed hazard risk analysis. Similarly, hazard vulnerability considerations could be included as an integral part of any poverty alleviation strategies or projects whilst the Bank could also take issues of hazard vulnerability into account in broader country strategy documents. To help facilitate this process, the Bank could sensitize its guidelines and policies - such as those pertaining to environmental considerations, social dimensions, poverty and gender - to issues of hazard vulnerability and disaster mitigation

B. Institutional stakeholders

51. There are a number of institutional stakeholders involved in various aspects of disaster management at the local, national, regional and international level. These include national and local government agencies in disaster-prone countries, community groups, NGOs, regional organizations and international and bilateral donors.

52. In the past, many of these stakeholders were particularly concerned with post-disaster relief and rehabilitation. In recent years, increasing emphasis has also been placed on disaster prevention and mitigation. However, to date such concerns have largely been confined to policy statements of intent. This reflects other, often more immediately pressing, demands on resources; a general emphasis in recent years on careful government budgetary management; limited hard evidence on the potentially high economic and social returns to mitigation measures; insufficient appreciation of the fact that even relatively minor adjustments can sometimes reduce hazard vulnerability considerably; and, in many countries; limited availability of information on hazard risks.

53. In seeking to enhance stakeholder capacity, the Bank could therefore play a potential role in encouraging governments in disaster-prone countries to place greater emphasis on prevention and mitigation, both through policy dialogue and by example. For instance, as a first step, the Bank could ensure that appropriate building standards are used in the construction of all Bank-financed infrastructure, both to reduce any potential disaster-related losses and to help strengthen the capabilities of partner government agencies and the local construction industry. In some countries, this exercise could also help prompt further hazard reduction activities, for example by highlighting a need for more detailed hazard mapping, for the development of improved building codes or for the provision of related training. Other suggested good practices are indicated above.

6. Conclusions

54. Since the late-1980s, the Bank has played an important role as one of only a few regular sources of funding for post-disaster rehabilitation. There is a clear need for continued Bank involvement in this area, particularly in view of the fact the scale and incidence of disasters could be increasing. The Bank is therefore currently working to improve the performance of these loans.

55. The Bank is also seeking to ensure that it reflects and supports recognized good practice in disaster management - namely, that of placing particular emphasis on disaster prevention and mitigation- and that its policies and operations remain appropriate in the face of changes in the scale and nature of hazard vulnerability in the region. The Bank is already addressing some of the factors contributing to a possible rise in hazard vulnerability, for example through its environmental policies and programs. However, it could potentially do more to promote disaster mitigation, both directly and indirectly. Indirect measures could include efforts to enhance stakeholder capacity; and to improve knowledge and understanding of the economic impacts of disasters.

56. As indicated at the outset, this paper represents part of an on-going consultative process on the future role of the Bank in the area of both post-disaster rehabilitation and prevention, mitigation and preparedness. The paper has outlined various ways in which the Bank could seek to strengthen its disaster-related policies and operations and respond to emerging new challenges, both in terms of its own operations and in catalyzing the actions of others. We would welcome any feedback and comments on the contents of the paper, particularly from the Bank's developing member countries,

and look forward to further discussions on these issues over the course of the next few days.

References

ADB. 1987. 'Rehabilitation Assistance to Small DMCs Affected by Natural Disasters'. R74-87. Manila: Asian Development Bank, June.

ADB. 1989. 'Rehabilitation Assistance after Disasters'. R19-88. Manila: Asian Development Bank,.February.

ADB. 1991a. *Disaster Mitigation in Asia and the Pacific.* Manila: Asian Development Bank.

ADB. 1991b. *Disaster Management: A Disaster Manager's Handbook.* Manila: Asian Development Bank.

Anderson, M.B. 1991. 'Which Costs More: Prevention or Recovery?'. In Kreimer, A and Munasinghe, M, *Managing Natural Disasters and the Environment: Selected Materials from the Colloquium on the Environment and Natural Disasters Management.* Colloquium sponsored by the World Bank, June 27-28, 1990, Washington, DC. Washington, DC: World Bank.

Hecker, G. 1994. 'A Review of the Disaster-Related Activities of the Asian Development Bank: An Economic Perspective'. Paper presented to the World Conference on Natural Disaster Reduction, 23-27 May, Yokohama, Japan. Manila: Asian Development Bank.

IFRC. 1998. *World Disasters Report 1998* Oxford: Oxford University Press.

Jovel, J.R. 1989. 'Natural Disasters and their Economic and Social Impact'. *CEPAL Review*, 38: 133-145. August.

Otero, R.C. and R.Z. Marti. 1995. 'The Impacts of Natural Disasters on Developing Economies: Implications for the International Development and Disaster Community'. In Munasinghe, M and C Clarke (eds), *Disaster Prevention for Sustainable Development: Economic and Policy Issues*, Report from the Yokohama World Conference on Natural Disaster Reduction, May 23-27, 1994. Washington, DC: World Bank and International Decade for Natural Disaster Reduction.

Table 1

ADB Emergency Rehabilitation Assistance Lending, 1987-1996

Country	Loan no.	Project title	Nominal Amount US$m	Real (1997) Amount US$m	Date approved	Sector assisted	Disaster type
OM-24							
Cook Islands	1171	Emergency Telecommunications Rehabilitation	0.6	0.6	18-Jun-92	Telecommunications	Fire/arson
Cook Islands	1586	Cyclone Emergency Rehabilitation Project	0.8	0.8	27-Nov-97	Multi-sector	Typhoon/cyclone
Papua New Guinea	1330	Rabaul Emergency Programme	0.5	0.5	6-Nov-94	Multi-sector	Volcanic eruption
Marshall Islands	1218	Emergency Typhoon Rehabilitation Assistance	0.5	0.5	28-Jan-93	Multi-sector	Typhoon/cyclone
Western Samoa	1019	Emergency Power Rehabilitation	0.5	0.6	17-May-90	Electric power	Typhoon/cyclone
Solomon Islands	1219	Emergency Infrastructure Rehabilitation	0.5	0.5	18-Feb-93	Multi-sector	Typhoon/cyclone
Total				3.8			
OM-25							
Bangladesh	882	Flood Rehabilitation (Flood Control & Irrigation)	14.3	18.7	4-Feb-88	Irrigation & Rural Dev.	Flood
Bangladesh	892	Flood Damage Restoration (Roads & Railways)	40.0	52.4	30-Jun-88	Roads & Transport	Flood
Bangladesh	941	Flood Rehabilitation (Rural Infrastructure)	40.0	52.4	22-Dec-88	Irrigation & Rural Dev.	Flood
Bangladesh	967	Second Flood Damage (Roads & Railways)	80.0	100.3	24-Aug-89	Roads & Transport	Flood
Bangladesh	1149	Cyclone-damaged Road Reconstruction	28.0	32.3	19-Dec-91	Roads & Transport	Typhoon/cyclone
Bangladesh	1182	Rehabilitation of Damaged School Facilities	15.0	16.9	27-Oct-92	Education	Typhoon/cyclone
Bangladesh	1666	Rehabilitation of Flood Damaged Infrastructure Project	104.0	102.0	16-Dec-98	Multi-sector	Flood
Cambodia	1199	Special Rehabilitation Assistance Project	67.7	76.1	26-Nov-92	Multi-sector	Civil unrest
Indonesia	1241	Flores Emergency Reconstruction	26.0	28.5	1-Jul-93	Multi-sector	Earthquake
Indonesia	1321	West Lampung Emergency Reconstruction	18.0	19.3	27-Sep-94	Roads & Transport	Earthquake
Kyrgyz Republic	1633	Flood Emergency Rehabilitation Project	5.0	4.9	24-Sep-98	Multi-sector	Flood
Pakistan	957	Flood Damage Restoration	44.0	55.2	30-Mar-89	Multi-sector	Flood
Pakistan	1209	Flood Damage Restoration (Sector)	100.0	112.4	15-Dec-92	Multi-sector	Flood
Philippines	946	Infrastructure Restoration	20.0	25.1	19-Jan-89	Multi-sector	Typhoon/cyclone
Philippines	1053	Earthquake Damage Reconstruction	100.0	120.1	22-Nov-90	Multi-sector	Earthquake
Philippines	1075	Special Agricultural Inputs Supply	35.0	40.4	24-Jan-91	Fertilizer Production	Earthquake/drought
Philippines	1163	Mt. Pinatubo Damage Rehabilitation	37.0	41.6	23-Apr-92	Multi-sector	Volcanic eruption
Western Samoa	1193	Cyclone Damage Rehabilitation	8.6	9.7	12-Nov-92	Irrigation & Rural Dev.	Typhoon/cyclone
Sri Lanka	865	Emergency Road Restoration	20.0	27.2	24-Nov-87	Roads & Transport	Civil unrest
Sri Lanka	888	Emergency Schools Restoration	15.0	19.6	23-Jun-88	Education	Civil unrest
Sri Lanka	1436	Emergency Rehabilitation of Petroleum Facilities	24.0	24.5	16-May-96	Natural Gas	Fire/arson
Total				979.4			

Table 2

ADB Disaster Mitigation Loans (values in US$m)

Borrower country	Project	Project number	Nominal value of loan	Real 1997 value of loan	Date of approval	ADF/OCR loan
Bangladesh	Dhaka Integrated Flood Protection	1124	91.5	105.7	21-Nov-91	ADF
	Secondary Towns Integrated Flood Protection	1202	55.0	61.8	3-Dec-92	ADF
	Khulna-Jessore Drainage Rehabilitation (a)	1289	50.0	54.8	14-Dec-93	ADF
Indonesia	Wampu River Flood Control and Development	0092	5.9	20.8	4-Apr-72	ADF
	Tulungagung Drainage (b)	0434	39.0	80.9	6-Dec-79	OCR
	Arakundo-Jambu Aye Irrigation & Flood Control	0685	68.0	101.6	5-Jul-84	OCR
	North Java Flood Control Sector	1426	45.0	45.9	18-Jan-96	ADF
	North Java Flood Control Sector	1425	45.0	45.9	18-Jan-96	OCR
	South Java Flood Control Sector	1479	103.0	105.0	7-Nov-96	OCR
Malaysia	Agricultural Drainage (c)	0446	25.4	52.7	19-Dec-79	OCR
	Klang River Basin Environ. Improvement & Flood Mitigation	1500	26.3	26.8	5-Dec-96	OCR
Pakistan	Flood Protection Sector	0837	115.0	156.4	25-Aug-87	ADF
	Second Flood Protection Sector		100.0	100.0	13-Nov-97	ADF
Viet Nam	Irrigation and Flood Protection Rehabilitation	1259	76.5	83.8	26-Oct-93	ADF
Total			845.6	1042.1		

Notes

a Project included a component to rehabilitate the existing drainage infrastructure to reduce congestion and protect the Project area from tidal and seasonal flooding.

b The objective of the project was 'to improve the living environment in the Project area by reducing the annual damage from recurrent floods agricultural crops, residential houses, commercial and other buildings and public infrastructure'.

c Project included construction of river and coastal embankments