Guidelines for integrating Weather Related Disasters Risk Reduction and Adaptation in Asia and the Pacific Regions for Senior Government Officials

Volume Two: Operation

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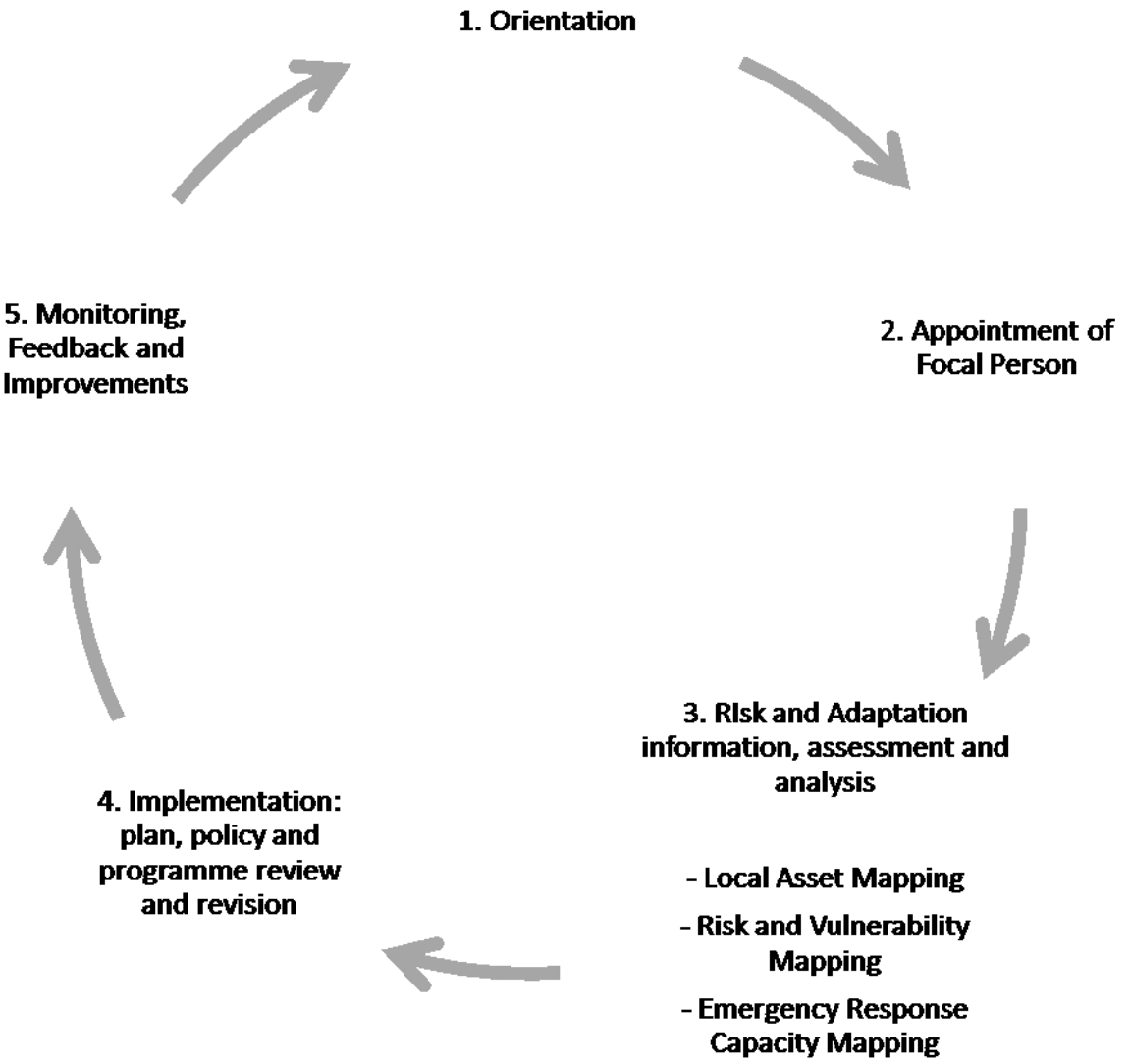
The guidelines recommend a procedural approach for integrating DRR and CCA into development planning across all sectors of national government using the following five-step approach:



Preface

The guidelines provide recommendations and identify good practice for DRR and CCA integration procedures at the national government level, with respect to training and operational considerations. It is designed to support the development of all levels of personnel in their respective roles in DRR and CCA policy implementation in national government departments in Asian and Pacific countries.

In every country in the region, when developing integrating DRR-CCA policies, operational procedures and training strategies, it should be used in conjunction with following publications:

- Hyogo Framework for Action (2005-2015)
- National disaster management plans, strategies and Acts
- National emergency management plans
- National Climate Change Adaptation Programmes (NCAP)

It is the intention of these guidelines to provide a foundation for DRR and CCA integration at central government level and local government departments in Asia and the Pacific. Where generic systems of the work are suggested, it will be a matter for each national government to carry out a risk assessment and, if necessary, seek specialist advice, to determine the most appropriate option for their own location and specific situation. However, consideration of the need for interoperability, compatibility and consistency in working practices and up to date local risk knowledge is essential to ensure an effective and efficient departmental responses to DRR and CCA integration in policy.

1. INTRODUCTION

Local and national risks and adaptation knowledge are of paramount importance. Therefore the need for consideration and implementation of suitable measure as outlined in the "HFA 2005-2015" must always be borne in mind by all heads of departments dealing with DRR and CCA in the government.

In the recent years every government in the region has had to cope with the effects of a substantial number of weather related incidents exposing the vulnerability of their populations. Climate Change can affect a population in two ways; slow onset impacts (drought; prolonged wet periods); and sudden and rapid impacts (typhoons, floods, heavy snow, long dry or wet spells, glacial lake overflow, landslides). Often, sudden and rapid impacts of climate change will come without warning leaving the population little or no time to react. Experience of previous incidents has shown that such events are rarely straightforward and often leave victims in a vulnerable state. Government departments at all levels are then faced with complex situations.

People have been known to survive the slow-onset impacts of climate change for many years and have developed adaptation strategies. Recent increases in the sudden and rapid impacts of climate change mean that governments in Asia and the Pacific region should expect these types of incidents every year. To manage the complex and multiple impacts of sudden and rapid climate change events, the government departments have a responsibility to integrate risk reduction and adaptation strategies jointly and apply a cross-cutting approach this issue. Following the publication of the HFA, reports from NGO's, development banks and other agencies have repeatedly highlighted the role and duties of government in overseeing DRR and CCA integration. However, it is seldom the case that strategies for strengthening institutional capacity are identified. The focus is often on improving community awareness and all too often cultivating awareness within and across governmental communities is overlooked.

While it is reasonable to expect that all the heads of government departments have an understanding of the vulnerability, risks, hazards and the principles of Disaster Risk Reduction and Climate Change Adaptation, it is likely that specialised training will be required for the individuals charged with developing and implementing policy depending on the scale and complexity of the local situation. The extent to which DRR-CCA policy integrations are carried out is a matter for individual department heads and it is likely that decisions will be based on comprehensive pre and post disaster risk assessments of weather related disasters.

BOX 1: What is Pre-Disaster Risk Assessment?

Pre-disaster risk assessment is a broad concept encompassing the need to understand the potential threats and dangers to society, the environment and the economy posed by hazards before they occur, to enable preparatory strategies to be implemented. This process can take many forms and involve many different sources of information to establish the existing situation, the nature and extent of the impacts which may result from a hazard event (acute or chronic), and the measures (procedural, policy-based, structural, educational) which can be put in place to reduce, alleviate or adapt to the risks identified.

BOX 2: What is Post-Disaster Needs Assessment (PDNA)?

Post Disaster Needs Assessment (PDNA) is a government-led exercise, with integrated support from the United Nations, the European Commission, the World Bank and other national and international actors. A PDNA pulls together information into a single, consolidated report detailing the physical impacts of a disaster, the economic value of the damages and losses, the human impacts as experienced by the affected population, and the resulting early and long-term recovery needs and priorities (IRP, 2011).

Examples of PDNAs include:

Crop and Food Supply Assessment Missions (CFSAM): CFSAM is coordinated by the World Food Programme for countries affected by widespread food emergencies due to disasters. The main objective of CFSAM is to generate evidence based information on food security during disasters and enable governments, the international community and others to take appropriate local actions.

Livelihood Assessment and Response System (LARS): LARS provides information on people's capacity after a disaster through assessment preparedness and livelihood response planning. This is a joint effort of the Food & Agriculture Organisation and the International Labour Organisation. LARS uses a Livelihood Assessment Tool-Kit (LAT) comprised of three assessment tools;

- livelihood baselines compiled at national level, targeting areas prone to natural hazards
- initial livelihood impact appraisal within 14 days of a disaster
- detailed livelihood assessment within first three months

These guidelines focus on preparedness and advocate a proactive stance towards risk reduction and adaptation through government integration of DRR and CCA. For this reason, pre-disaster risk assessment is considered a key component of the approach which is detailed in the following sections.

Many governments in Asia and the Pacific regions have separate central departments for dealing with disaster risk and for dealing with climate change adaptation. Both the departments are designed to tackle risk locally. These departments should either be combined, forming a new DRR and CCA department or encouraged to form a joint coordination body at the central (national) level to oversee integrated risk and adaptation policy formulation. Both departments will consist of team members who have

valuable knowledge on DRR and CCA in the regional and international contexts and a merging of this information will facilitate a more streamlined and efficient perspective for evolving DRR and CAA strategies for development plans.

All national government departments should liaise with the centralised DRR and CCA department or joint coordination body to ensure that all departments obtain an operational knowledge-base for integrating risk reduction and adaptation into the departmental policies and programmes. This will also ensure continuing interoperability with HFA2005-2015 and the National Adaptation Programme and procedures as government officials develop their own capacities and understanding.

The propose of these guidelines are to provide awareness on integrated disaster risk reduction and climate change adaptation policy, departmental coordination and operational procedures relevant to minimise the impact of weather related disasters in Asia and the Pacific regions. It must be emphasised however, that this is only guidance: each weather- related disaster is different and each government will need to exercise professional judgment to reduce disaster impact and vulnerability locally according to the circumstances present.

2. HOW DO I START INTEGRATING DRR AND CCA INTO THE POLICIES AND PLANS OF MY DEPARTMENT?

A growing number of national governments recognise the need to integrate DRR and CCA policies into their development plan. It is not always clear how to start integration. This section aims to provide a step by step guide to help get started with integrating DRR and CCA into planning and policy in government departments so that DRR and CCA are seen as intrinsic elements of development planning and not viewed as an extraneous burden.

Step One: Staff Orientation on DRR and CCA

It is crucial to foster a culture of risk reduction and adaptation awareness within your staff at both individual and inter-departmental levels if comprehensive integration is to be achieved. This element is frequently overlooked by agencies wishing to begin cross-sector DRR and CCA integration and in reviewing the literature to prepare these guidelines, it was noticeably absent in the methods employed by countries and agencies in their integration endeavours. Given the relatively recent inception of these areas of focus, it is unwise to assume that competent levels of knowledge about DRR and CCA already exist in all personnel within your department to allow them to fully appreciate the task of integration. Organise staff seminars in your department on national and local weather related risks and find out how this risk might affect your departmental plans and programmes. Invite experts from metrological offices, emergency services, academics and health departments to provide sector-based impact information on weather related disasters.

After the seminar your staff will have obtained knowledge on weather related risk and disaster impact at national level. Ask your departmental staff to prepare a list of local and national risks and ask your staff what you are currently doing to avoid risk. This will help to increase awareness on local risk and adaptation and identify any immediate shortcomings. This process is preliminary, however it serves to familiarise and consolidate the concept of disaster risks and adaptation strategies with the staff involved at a personal level. This will raise the overall attentiveness of staff to weather-related risks and direct attention to these issues in future

Step Two: Nominate focal person

Once you have conducted the first seminar series, appoint a focal person within your department to continue the seminar series for a minimum of a year. The focal person

will follow up on the outcomes of the seminar series and update local risk and adaptation information. This will help to keep the department up to date on risk and adaptation information. The focal person should be encouraged to develop a network with other departments within the ministry and other ministries' departments to facilitate information-sharing and joint working.

Examples:

In Singapore, the Deputy Prime Minister has appointed a ministerial committee on climate change to oversee the National Climate Change Strategy, which includes a delegate from every government ministry on the panel to ensure cross-sector awareness and policy implementation. In developing the country's Strategy, opinions and information from a variety of stakeholders, including the general public, were sought. Given the wide-ranging and cross-cutting nature of many of the country's climate change initiatives, the Committee has set up sub-panels and working groups to direct specific plans and workings (World Bank, 2008).

In New York City, the mayor has created the Office of Long Term Planning and Sustainability, which has a mandate to work with other local government departments to address housing, transportation and infrastructure needs. The Office has conducted meetings with the community and local businesses and set up a website for receiving comments and information from stakeholders, and in order to further define the climate change agenda the Office has developed links with the Environmental Protection Agency, Region II; Federal Emergency Management Agency, Region II; U.S. Army Corps of Engineers; National Park Service; Gateway National Recreation Area; Port Authority of New York and New Jersey; NYC Department of Environmental Conservation; NYC Energy Research and Development Authority; NYC Department of Environmental Protection; NYC Department of Health; NYC Department of City Planning; NYC Department of Design and Construction; NYC Department of Parks and Recreation; Con Edison; Metropolitan Transit Authority; and the Regional Plan Association (World Bank, 2008).

In 2005, Mexico's government established an Inter-Ministerial Climate Change Commission to coordinate the country's adaptation and mitigation policies and actions. The Commission is headed by the Ministry of Environment and Natural Resources and comprises the Ministers of Foreign Affairs; Social Development; Energy; Economy; Agriculture, Livestock, Rural Development, Fisheries and Food; Communications and Transportation; and Finance and Public Credit, representing a truly cross-sector approach at the national level (Kramer, 2007). Within the Commission, six Working Groups have been set up: Special Climate Change Program, Adaptation Policies, Reducing Emissions from Deforestation and Forest Degradation, Mitigation, International Climate Change Negotiations, Mexican Committee for Emission Reduction and Greenhouse Gas Capture Projects. As a result of the efforts of these Working Groups, in 2007 the National Climate Change Strategy was produced which informed the development of the Special Climate Change Programme, published in 2008, which contains the national sustainable development policies of Mexico, including directions to conduct a vulnerability and risk assessment for climate change factors. A public consultation

exercise on this programme was undertaken prior to its publication (Dirección General de Políticas para el Cambio Climático, 2010). Structurally, this case represents the development of a comprehensive, cross-sector national policy framework for tackling climate change, both through mitigation and adaptation strategies. Its practical effectiveness will only be known in time but this is in an illustration of an attempt to approach the issue in an all-inclusive manner.

Step Three: Risk and adaptation information, assessment and analysis

It is important that accurate information on weather related risk identification and local physical and social conditions are recorded and communicated in a standardised manner across departmental sectors to ensure uniformity and clarity.

There are a number of categories into which information needs can be divided, namely:

- Local assets (physical and social) mapping
- Emergency Response Communications Infrastructure mapping
- The identification of hazards
- Possible high and low casualty location zoning
- Hazard, Risk and Vulnerability mapping
- Emergency response capacity monitoring

The above information requirements are for the integration of DRR and CCA policy formulation operations. Further information is provided in the following section.

Local Assets (physical and social) Mapping

It is crucial to understand the quantity and location of valuable assets within the locality in order to consider risk and vulnerability. The first stage of this process is therefore to identify and map the existing resources within your area. This is likely to include:

- Services Infrastructure and Utilities mapping (above and below ground): gas pipelines, electrical connections, water, waste water systems, communications infrastructure, emergency response communications infrastructure, reservoirs, treatment plants
- Historical and Cultural Monuments mapping
- Key amenities structures mapping: schools, government buildings, power plants, transport routes, airports/stations, economic institutions, hospitals

- Topographical features mapping: land-uses, environmental features, high-ground locations; open spaces
- Designated Shelters and Evacuation Routes (from flood, typhoon etc.)
- Emergency Services and/or Military presence in the locality (capacity; personnel; equipment)
- Existing Structural Defences from natural and technological hazards

Hazard, Risk and Vulnerability Mapping

Once the asset-mapping exercise is completed, it is possible to begin assessing risk and vulnerability within your locality. Risk is comprised of the presence of a hazard combined with the existing vulnerability of population.

> *From a development plan perspective, risk and vulnerability assessment is an examination that can help to make development activities sustainable and prudent.*

It is necessary to think about the following when identifying hazards and evaluating the risks present:

- Likely effects of climate change on the circumstances of your area: sea level increase, flood events, drought, high winds, emergence of new diseases and increased vector habitats. Modelling can be very useful for predicting future scenarios.
- Environmental factors: steep slopes, flood plains (operational and extreme flood event), ground conditions, air quality, coastal areas
- Risks to Infrastructure: for example: economic institutions, political power centres, utilities/infrastructure services,
- Risks from human-made structures with a technological hazard: for example: nuclear power plant, biological, chemical, structural fault/failure of defence features (e.g. dam)
- Possible high and low casualty locations: high population areas; taking into consideration the potential effects of climate change: for example: increased rainfall>wider flood zone>previously safe buildings now in extended flood plain; increased rainfall>decreased slope stability>previously secure ground now at higher risk from landslides

- Current Social Capital: consider measuring socio-economic status, race, age, gender, community groups, religious groups, business community

This is likely to require further information gathering in order for the department to fully assess the risks and vulnerabilities which are present. A number of assessment tools have been developed for this purpose (see Box 3): risk and vulnerability will be unique for each location and therefore it is recommended that government departments choose or adapt the assessment process so that it is most appropriate to their sector.

BOX 3: Examples of Risk and Vulnerability Assessment Tools

Vulnerability and Capacity Analysis: The Vulnerability and Capacity Analysis (VCA) methodology helps with understanding the implications of disasters for the lives and livelihoods of the affected people. By combining local knowledge with scientific information, the process builds people's understanding about risks and adaptation strategies. It provides a framework for dialogue within communities, as well as between communities and other stakeholders. The results provide a solid foundation for the identification of practical strategies to facilitate community-based disaster risk reduction and adaptation.

Risk Registers: The Risk Register is a tool that allows for the identification, analysis and management of risk. It is used in many countries around the world (e.g. UK, Australia, New Zealand and France). As well as providing a valuable source of information for policy-makers, Risk Registers are designed to increase awareness of the kinds of risks and encourage individuals and organisations to think about their own preparedness (UK Cabinet Office, 2008). It provides the basic information needed to plan for emergencies.

Departmental Emergency Response Capacity Monitoring

It is necessary for each department to develop an emergency response plan relative to their area of responsibility within government, in conjunction with other related departments, in order to ensure a coordinated and achievable response. The ability and capability of each department to perform the duties detailed in the emergency response plan should be considered in its development and continuously monitored to ensure the plan can be enacted successfully.

Understanding the response and preparedness capabilities of the emergency services and the plans of other important bodies can greatly improve the effectiveness of each department’s strategy for responding to an emergency.

Examples:

In Bhutan, as part of the National Adaptation Programme of Action the government has undertaken a comprehensive glacial lake outburst flooding (GLOF) hazard mapping exercise along the length of the Puna Tsang Chu River as a number of large hydroelectric power stations are planned along it. These maps are informing the decisions of town planners involved with these and other development projects along the length of the river, and are also assisting emergency planning measures in local communities in GLOF hazard locations. These maps are effective because of the comprehensive and numerous sources of information on which they are based, including: topographical maps; satellite images; land use maps; material maps; slope maps; socio-economic information. These were used to effectively determine the relative degree of hazard present (Karma et al., 2009).

In France, the overall disaster management strategy for the country, the Plan for Prevention against Natural Risks (PPR), includes the production of hazard and vulnerability maps by region, which in turn are used to develop zoning maps and policies for land use and construction which take account of the specific risks present in a particular community or prefecture. Implementation of the PPR is ongoing across communities in France. It is supplemented by an on-line register of locational risks which is maintained by the Ministry of Land Use Planning and of the Environment: it is publicly accessible to all citizens to increase their awareness and knowledge (UNISDR, 2002).

The production of the Vulnerability Atlas of India in 1997 is of particular importance for highlighting the significance of land use strategies which consider the risks from existing built form as well as land use strategies for future development. The plan is informing regulation and policy changes regarding land use and construction across the country, and has also stimulated more localised assessments of vulnerability to allow land use planning to simultaneously respond to risks and community needs. Natural resource protection and agricultural and environmental management have also become a focus for land use policy following the production of the Atlas, as it has been realised that this can also contribute to disaster risk reduction. New government agencies have been set up to address specific target areas such as soil conservation and watershed management (UNISDR, 2002).

Step Four: Implementation

At this stage, your staff now has a wealth of information at their disposal to inform the procedural integration of DRR and CCA strategies into their respective plans and policies. This includes:

- Asset Maps
- Hazard, Risk and Vulnerability Maps

- Departmental Emergency Response Plan and Knowledge of Other's Response Strategies

It is now time to review existing plans and policies in the context of this information. The integration of DRR and CCA in policy evolution is not a case of starting afresh, rather it is a process of considering the implications of existing plans and policies in light of the new information about hazard, risk and vulnerabilities and identifying where requirements can be merged into these policies to reduce risk and lessen exposure to the impacts of climate change and disasters. It is important to remember that this presents an opportunity not only for addressing overt issues but also to target the underlying factors contributing to risks, in line with the key action areas defined in the Hyogo Framework for Action (2005-2015). This process could range from deleting policies which may increase risk, to modifying or caveating those to exclude what are now identified as risky activities or behaviours. At the national level of government, the ability to introduce new laws, regulations and taxes may also be of assistance in the integrating process. It may be useful for a department to develop a checklist of assessment criteria based on the hazard/risk/vulnerability information for conducting such reviews, to ensure a standardised and transparent process. It is not the purpose of these guidelines to specify exact DRR or CCA measures and strategies, as this will be contingent upon the findings of the hazard, risk and vulnerability mapping and thus vary by location.

For DRR and CCA integration to be successful, it needs to be implemented at all levels of government, across all sectors. Cross-sector working will be essential to avoid the emergence of duplicated or conflicting policies. Best practice and policy should be disseminated between local, national, regional and international levels to maximise knowledge-sharing and strategy effectiveness. As well as information-dissemination in the form of seminars, providing those in other sectors with the opportunity to observe practical examples of DRR and CCA policies being implemented on the ground can often serve to strengthen the understanding of what this integration can achieve.

Examples:

For developing countries, making simple modifications to construction or land use requirements can be more realistically achievable than introducing complex standards for built form. For example, following the Gujurat earthquake in India in 2001, the two worst affected municipalities, Bhuj and Anjar, realised they did not have the resources or knowledge base to enforce built code standards for the reconstruction process, but instead placed a limit of 2 storeys on all rebuilds (Spence, 2004 as cited in UN, 2011).

In 2007 Albuquerque, New Mexico implemented a revised Energy Conservation Code which requires all new residential and commercial buildings and existing buildings undergoing alterations to be more energy efficient. The standards apply to water usage, heating/cooling, ventilation and lighting appliances and inspections are carried out to ensure that adequate standards have been achieved (World Bank, 2008).

Vietnam's ministries of government represent an example of successful DRR integration. DRR has been mainstreamed into:

- land use plans to limit residential construction in at risk areas;
- laws on forestry protection to limit deforestation, require afforestation and to provide policy guidance on fire fighting;
- laws on mining to regulate pollution and environmental damage; and
- policy on water management to address water resource and quality issues, and to address flooding risks.

All of these areas fall within the remit of implementing DRR and CCA through strategic land use planning and demonstrate how critical and effective this area is to achieving disaster risk reduction (Tearfund, 2006).

The Institute for Physical and Spatial Planning in Cuba overseas all tiers of town planning in the country and is an example of successful integration of DRR into land use strategy. Because it is responsible for all governmental levels of jurisdictional planning, and for a wide range of land use issues (built form development; natural resource and environmental management; vulnerability and risk management), the planning system has a great degree of control over development and its impacts. Based upon a sound and well developed legal and policy framework, the system includes the use of building codes and risk zoning to reduce vulnerabilities due to development, whilst at the same time promoting sustainability principles. The policy framework controlling private and public land use at the local level is developed through the use of feasibility studies and assessments to inform suitability for development, and also involves cross-sector working with other agencies such as the meteorological centre and civil defence authority in order to gather the most detailed information. Regulations are also in place which require physical vulnerabilities and impacts to direct financial investments for certain types of developments (UNISDR, 2002).

Maryland State in the USA is pursuing a structured approach to developing climate change adaptation policy and strategies. The state's '*Comprehensive Strategy for Reducing Maryland's Vulnerability to Climate Change*' is being developed in phases by specialist working groups formed within the Maryland Commission on Climate Change, each concentrating on specific sectors of concern. These groups are involved in collecting and analysing the latest available data on climate change and adaptation/mitigation strategies. Phase I addressed sea level rise and coastal storms and identified 18 key legislative and policy actions for the state to enact. Phase II has just been completed and focuses on building societal, economic, and ecological

resilience to climate change through guiding policy decisions and strategies within the following sectors: Human Health; Agriculture; Forest and Terrestrial Ecosystems; Bay and Aquatic Environments; Water Resources; and Population Growth and Infrastructure. The Phase II report identifies policy and strategy actions by government department and also indicates, for each action, those departments with which cross sector working will be required to achieve comprehensive and optimal integration. This level of detailed direction is desirable for the implementation stage as it demonstrates that cross-sector implications have been considered (Boicourt & Johnson, 2010).

The system of local government in the UK has introduced a series of commitments and policy requirements for local authorities to develop plans for low carbon frameworks, energy efficiency requirements, and sustainable development objectives. Schemes such as Local Agenda 21, the Climate Change Act (2008) and the development of Local Area Agreements and national indictors for a variety of sustainability and climate change concerns has allowed for the integration of CCA from the national to the local level of government (Shaw & Theobald, 2011). *"... of the 300 applications submitted under the 2007 Sustainable Communities Act, the most popular category was environmental sustainability, with a number of local authorities calling on the Government to use the tax system to incentivise the generation of power within local communities, while others requested that local authorities be given the power to develop local energy strategies that identified local demand and need"* (Shaw & Theobald, 2011, p.8).

Step Five: Monitoring, Feedback and Improvements

Disaster management is a continuous process: risks evolve and change with variations in the climate and in human activities and therefore planning for and responding to these hazards is a constant requirement. It is necessary to monitor the success of the integration of DRR and CCA into development planning to ensure that the aims of such strategies are being met. This can be done through:

- Constant and standardised hazard monitoring and risk assessment
- The use of up to date information on climate change projections
- Evaluation of strategies/programmes/policies performance against set targets at regular intervals
- Actively engaging with other professionals to acquire new knowledge and techniques for DRR and CCA

Where it is identified that targets are not being met, the plans and the government departments in charge of them must be flexible enough to allow for change and improvements to be implemented swiftly. Learning from unsuccessful strategies can be

just as useful as defining beneficial ones. Critically, a system which includes monitoring and feedback to improve itself and learn from its mistakes can also provide justification for future budgets for the coming financial years.

Examples:

The Inter-American Development Bank (IDB) has taken a financial approach to supporting DRR integration, by providing Policy Based Loans to Peru and Costa Rica which have allowed the governments to produce a legal framework for integrating DRR objectives and for encouraging the use of CCA strategies in public investment schemes (IDB, 2011). Peru and Costa Rica have integrated disaster risk assessment into the legally required approvals process for all publicly financed projects: if risks are not addressed, financing is not permitted. Peru's National System for Public Investment development assessment standards and risk tools, and trained advisors across multiple sectors of government between 2004-2007 in order to secure a longer term perspective towards public facilities and investments. A similar system was launched in Costa Rica in 2007 to integrate the consideration of risk reduction into public investments which were simultaneously evaluated against strategic development plans. Both of these initiatives have fostered institutional and academic relations with government. It is however, highlighted that these risks should be considered at previous, higher level strategic planning stages of the process, rather than only considered at the project level (UN, 2011).

3. CASE STUDIES ILLUSTRATING CURRENT PROCEDURAL ACHIEVEMENTS AND CHALLENGES IN DRR/CCA INTEGRATION

3.1 The Republic of Korea: the integration of pre-disaster risk assessment into the development planning sector

Pre-Disaster Impact Analysis (PDIA) is a new tool developed to address increasing risk due to development. It is a mechanism to establish appropriate risk reduction methods by analyzing and predicting disaster risk associated with development projects prior to their implementation. It is largely focused on technical interventions but it attempts to establish ecological and economic based mechanisms as well.

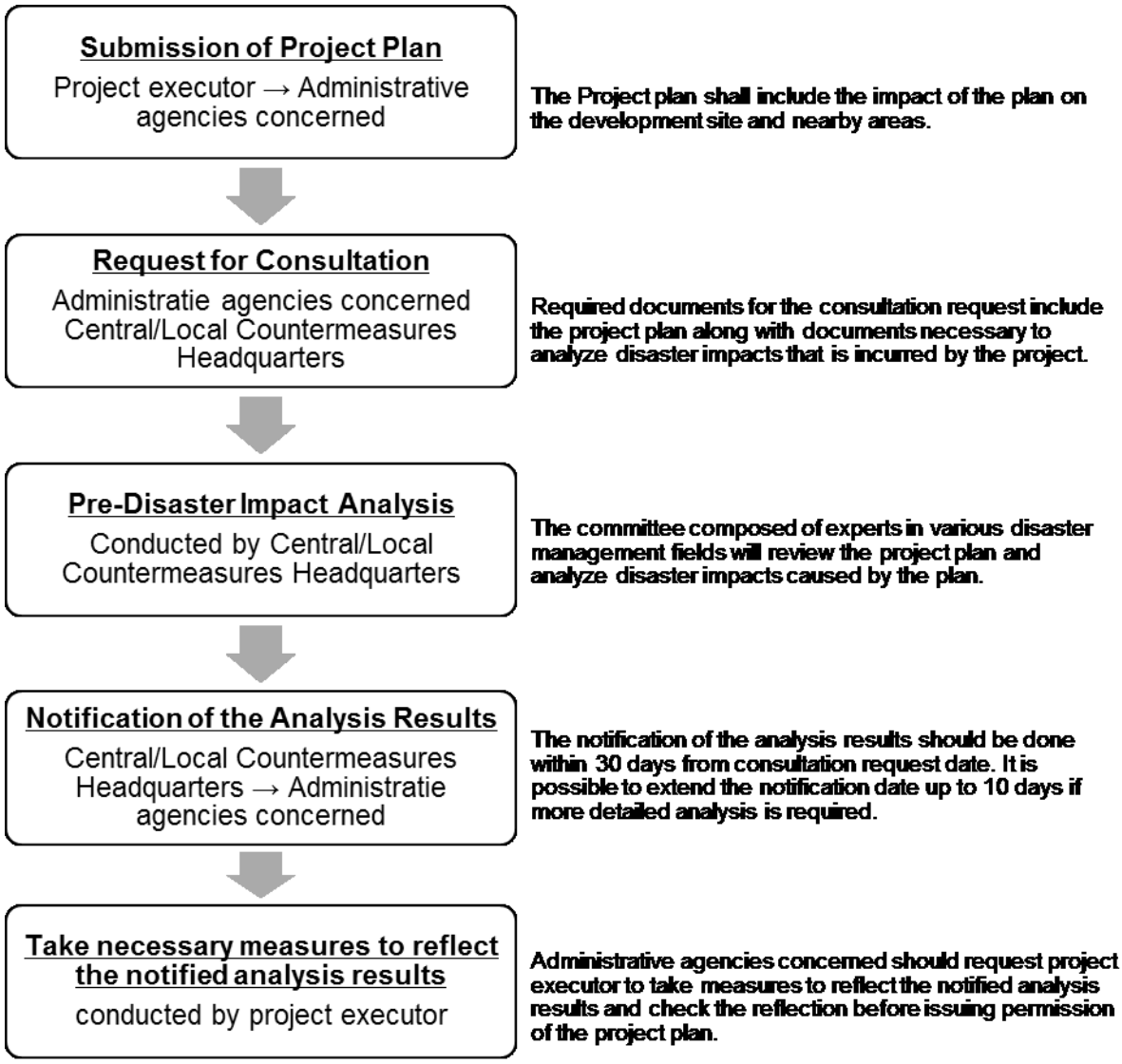
In 2005 the Korean government revised the Natural Disaster Countermeasures Act (NDCA) and Pre-Disaster Impact Analysis (PDIA), comprehensive disaster prevention planning and community-based disaster prevention were introduced into the Act. This integration shifted disaster prevention policy from a recovery to a prevention stance. PDIA is one of the most powerful tools to reduce risks associated with development projects and represents a leading example of pre-disaster preparedness.

The purposes of PDIA are:

- to assess the safety of the development site;
- to estimate the project's impact on the areas near to the development site; and
- to find ways to reduce risks increased by the project.

PDIA is a legally binding review conducted by a special committee which is composed of various experts in the fields of hydrological and seismic engineering and other related subjects.The detailed procedure of PDIA is shown in Figure 3.1.

Figure 3.1: Process of PDIA Consultation



When the committee examines project plans, it addresses disaster risks in two ways: a common review category and a category specified by the characteristics of the area. This may be broadly interpreted as a situational and site analysis respectively. The common review category is applied commonly to all project plans regardless of the characetristics of the areas where development site is located. Key considerations in the common review category are:-

- The possibility of disaster occurrence at the site after development due to future hazard, vulnerability of the area and increased exposure;
- The impact of the development on nearby areas, e.g. increased rainfall runoff and sediment yield;

- The inclusion of areas vulnerable to natural disaster within the development site and available countermeasures to strengthen the area;
- The relationship with nearby administrative areas, their development plans and other nearby proposals that are already approved (incombination effects);
- The inclusion of a river and stream within development site;
- Excessive terrain deformation, e.g. excessive slope cut and soil embankment;
- The inclusion of coutermeasures for reducing rainfall runoff.

After reviewing the common category, the committee reviews the proposal against the category specified by the characteristics of the areas. These are: urban areas, coastal or island areas, mountainous areas, rural areas, and river and lake areas. Key contents of the category specified by the characteristics of the areas are summarized in Table 3.1.

Table 3.1: Review Categories by Area

Areas	Review Category
Urban areas	- Avoid placement of densely populated facilities in lowland. - Promote development in locations other than low-lying land, particularly core functions of the existing downtown and public facilities. - Ensure safety from disaster-prone areas, inundation risk areas, etc. - Include the establishment of emergency management facilities for ensuring disaster prevention. - Enhance rainfall dispersion measures such as infiltration facilities, reservoir, open spaces, etc.
Coastal or Island Areas	- Include countermeasures for areas vulnerable to storm surge and tsunami. - Take measures to reduce disaster risks caused by increased sea level due to the development if the plan includes landfill. - Enhance disaster protection measures for lowland areas such as detention basins, outfall devices, seawater backflow prevention devices, etc. - Analyze the effect of the development on sensitive environments (e.g. for coastal erosion).
Mountainous Areas	- Take measures to prevent sediment yield and slope failure for cutting and banking slopes. - Avoid planning facilities, such as buildings, in areas near unstable ground - Avoid development in steep sloped areas. - Minimize the amount and size of cutting and banking slopes. - Assess the impact of sediment yield due to development on downstream areas and take steps to reduce the impact.
Rural Areas	- Assess the impact of development, such as the construction of agricultural and industrial complexes, on nearby areas and take measures to reduce the impact. - Include vulnerability assessment and disaster prevention measures in

	residential environmental improvement plans for rural areas. - Secure sufficient detention basins in connection with pump stations and take measures to utilize abandoned rice paddy fields in case of insufficient detention space.
River and Lake Areas	- Secure drainage control measures to protect lowland or areas with fragile soil. - Ensure disaster prevention measures for frequently flooded areas. - Consider hydraulic characteristics when constructing river crossing infrastructure. - Take measures to reduce the amount of sediment borne directly to watercourses.

Since PDIA was introduced in 2005, a total of 17,950 project plans were reviewed by the system. In 2009, NEMA conducted research to evaluate the effectiveness of PDIA by sampling 27 development sites. The research indicated that PDIA reduced disaster risks potentially incurred by development projects by:

- reducing sediment yield by an average of 70% during development,
- reducing rainfall runoff by an average of 30% during and after development, and
- reinforcing slope stability through an analysis of slope safety.

No disasters were reported at the 27 development sites. The following two cases show how PDIA contributed to reducing disaster risk due to development projects.

The Nine Bridge Golf Course in Yeoju, Gyeonggi-do: In July 2000, the maximum rainfall was 69 mm per hour, and heavy rainfall caused by Typhoon Rusa resulted in rainfall of 279 mm per day, which was the largest amount of rainfall recorded in one day. The location of the development site was mostly forest areas, and the heavy rain in 2000 and 2002 destroyed dykes in the rivers near to the development site. As a result of the PDIA consultation, it was agreed that seven temporary and four permanent retention facilities, serving as settling basins, would be installed, which also served to secure slope safety. Through these measures, runoff from the development was reduced by 37.65 percent, sediment yield was reduced by 1,660m3/year, and a 1.60 minimum safety factor was secured for the sloped areas, considerably above the threshold safety factor of 1.3.

Central Line Train Depot: The area experienced frequent heavy rains throughout the year, where maximum rainfall was 97 mm/hr, 346 mm/day, and 2,254 mm/yr compared to Korea's average rainfall of 1,283 mm/yr. In addition, when Typhoon Rusa struck the area in 2002, most low-lying residential houses collapsed and farmland areas were inundated. As a result of consultation, one permanent and four temporary retention facilities, serving as settling basins, were installed along with berm breakwaters to stabilise the slope. As a result, 30 villages and 18 ha of agricultural land were protected

from flooding, sediment yield was reduced by 43 per cent, storm water runoff was reduced by 1.03 percent, and flood water levels in downstream areas decreased by about 0.01m.

3.2 United Kingdom: the development and integration of a multi-level, multi-hazard risk and vulnerability assessment tool

The UK Government has published a National Risk Register which sets out an assessment of the likelihood and potential impacts of a range of different risks that may directly affect the UK on a national scale. The National Risk Register process is designed to increase awareness of the multiple types of risks the UK faces, and to encourage individuals and organisations to think about their own preparedness. The register also includes details of what the Government and emergency services are doing to prepare for emergencies.

The development of risk registers is both a 'bottom-up' and 'top-down' practice: communities in partnership with local emergency services collect and record risk in a Community Risk Register which informs local government. Local government then informs Regional and National Government, which allows for the creation of the National Risk Register (NRR). The National government uses the NRR to allocate risk reduction and response funding which is channeled through local authorities and emergency services back to local areas to address risk.

The Civil Contingencies Act 2004 of the UK places a statutory obligation on all emergency responders to carry out risk assessments and to maintain a Community Risk Register (i.e. a register of assessments carried out) at the local level. The risk register is part of the process of recording how specific risks in a local area or organisation will be addressed. Each risk that is identified is recorded in the register which summarises:

- A description of the risk, its cause and impact;
- The existing controls for the risk;
- An assessment of the consequences and likelihood of the risk happening with the existing controls;
- The risk rating: low, medium, high or very high;
- The overall priority of the risk.

Once the risk register is completed, it is then possible to formulate how to manage or treat the risk by recording the priority status and options by creating an operational plan.

The risk register and the operational plan facilitate the future recording, monitoring and management of risks in the workplace and the community.

There is a legal requirement to publish the Community Risk Register. In order to comply with UK legal requirement local authorities through Local Resilience Forum publish the documents for general public. The purpose of the Risk Register is to reassure communities and individuals that potential hazards have been assessed, and that effective preparation strategies and response plans exist.

Keeping a record of the risks allows for a review of whether risks have changed or new risk need to be added. Addressing risk does not need to be complicated; high risk areas can be broken down into a series of smaller steps and responsibility spread across a team or department. The UK experience advises that risks should be reviewed regularly, and monitored continuously. Where information suggests a potential change, this is incorporated into a revised risk assessment within the Register.

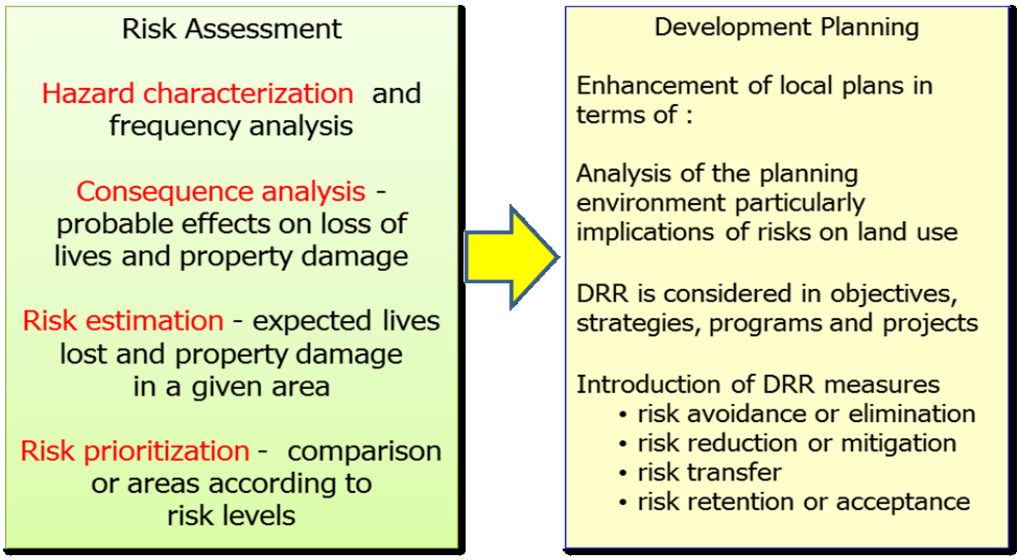
The Risk Register is a tool which serves as a means for enabling government to perform its duty to evaluate and prioritise risk reduction measures according to the assessed size of the risk and gaps in the documented capability required to respond to this risk.

3.3 The Philippines: an example of a flawed approach to DRR and CCA integration

In the Philippines, the Australian government in conjunction with the UN and the World Bank have funding a programme to mainstream DRR and CCA in local planning and investment programmes. Previously, DRR and CCA were addressed by two separate government agencies, based on two national acts: Climate Change Act of 2009 and Disaster Risk Management Act 2010. Under the funding programme, the separate CCA and DRR agencies have formed a joint body for a coordinated approach to integrating risk reduction and adaptation in development planning.

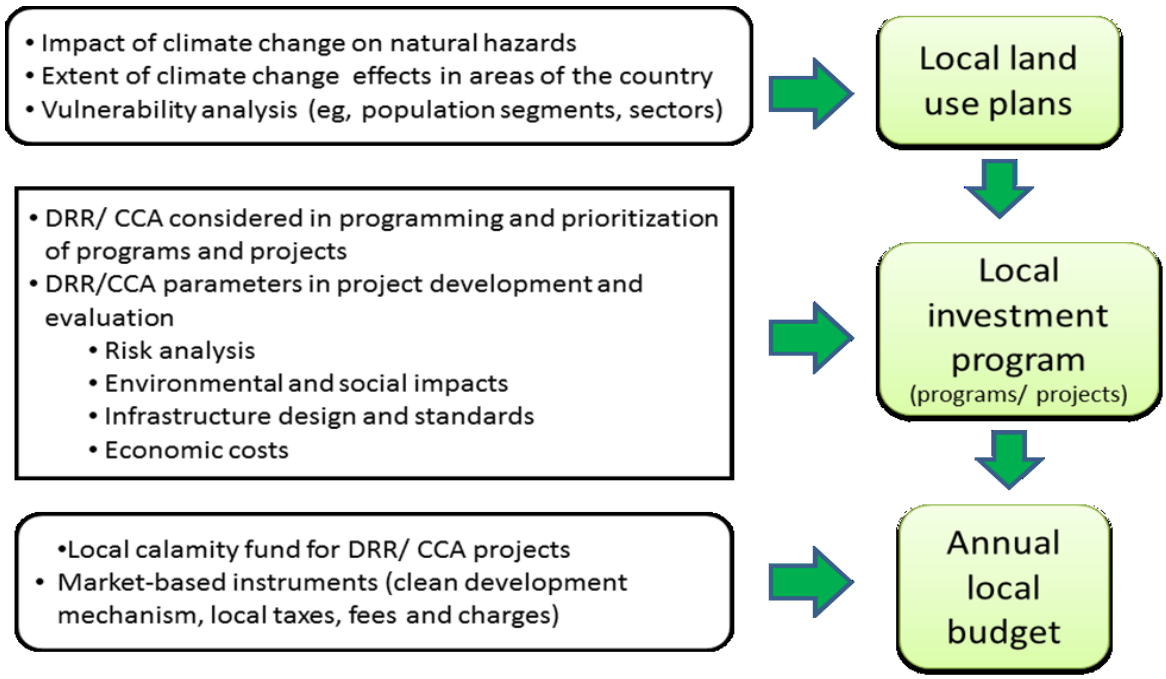
Figures 3.2 and 3.3 show the process the Philippines are pursuing to integrate DRR and CCA in development planning.

Figure 3.2: Integrating Disaster Risk Reduction and Climate Change Adaptation in the Philippines



(Source: Endencia, 2010)

Figure 3.3: Integrating Disaster Risk Reduction and Climate Change Adaptation in the Philippines



(Source: Endencia, 2010)

However, this initiative is project driven (donor-dependent) and questions remain over how it will be maintained once donor funding has finished, particularly with respect to

the continued collection of risk data. Risk is constantly changing and therefore in order for the integration to be successful in the long-term, risk monitoring needs to be sustained. It also requires cross-party political commitment to maintain the aims and objectives of the programme.

It is also notable that the process omits any reference to improving the awareness and knowledge of the government's development planning community regarding DRR and CCA, presumable assuming that a pre-existing level of appreciation for these factors which may not actually be present. With reference to Figure 3.3, whilst the process details integration of DRR and CCA considerations across several sectors of government, there is no reference to emergency response capacity, either in terms capabilities or future concurrent funding.

3.4 England: Flood Risk Reduction integrated into the Land Use Planning System

One of the main natural hazards faced in England is flooding from fluvial sources and ground saturation. To address this, the land use planning system employs strict constraints on the location and type of buildings and infrastructure which can be situated in areas potentially subject to flood risks. This is achieved through integration at both the policy/plans level and the project level.

Land use plans and the accompanying policies produced by authorities at the regional and local level are informed by strategic flood risk assessments (SFRAs), which identify the location and extent of likely future flood events from rivers, the sea, and drainage and infrastructure systems (EA, undated). Flood risk areas are classified as Zone 1 low risk (less than 1 in 1000 year chance of flooding), Zone 2 medium risk (less than 1 in 100 year chance of flooding from river sources or less than 1 in 200 year chance from tidal flooding), Zone 3a high risk (greater than 1 in 100 year/1 in 200 year chance of flooding from rivers/sea), and Zone 3b which is classed as the functional flood plain (Department of Communities and Local Government, 2010). Within each of these Zones, limitations are imposed on the types of development which can be planned according to the vulnerability associated with each land use category. Thus, in producing a land use plan for a district, zoning for a business park or sports fields may be permitted in an area with moderate flood risk, whilst a school or a residential development would not be considered. However, it is also required that for any development type proposed for zoning in riskier areas, a very strict series of conditions are met to establish that there are no other, more sustainable and less hazardous locations that the land use type could be located in: the system is designed to disallow any proposals which cause concern from a flood risk perspective (Department of Communities and Local Government, 2010).

The government also has a public body called the Environment Agency (EA) devoted to the management and monitoring of water bodies and water courses within the country. In terms of land use planning, the EA has a duty to advise the authority on how to avoid, manage and reduce flood risks (EA, undated).

Any development proposal submitted to an authority for approval is considered against the land use plan and the flood risk information in the SFRA to determine its level of risk. Where a watercourse or flood outline is present within or near to the development site or flooding from other sources is identified as a potential issue, the authority can require the developer to submit a more detailed flood risk assessment (FRA) for the application site in question, based on specific local topographical information, river flow rates, climate change and rainfall projections to precisely model the extent of the likely flood envelope in this area. The FRA must also factor in the effects of the proposal on areas downstream of the site location, particularly if surface water run-off rates are likely to be increased as a result of the built form. Surface and storm water drainage systems must be fully designed to account for the development's effects. If built form is proposed within an area where flood risk is a possibility and thus the development would decrease the currently available flood storage capacity in this area, compensatory flood water storage capacity must be provided in a nearby location.

Authorities receiving development applications which require the consideration of flood risk issues are required by law to consult the Environment Agency. The EA has the technical expertise to work with developers to ensure that all flood risks have been adequately accounted for and addressed within a development proposal (EA, undated). Only once the EA is satisfied with the data provide and the solutions proposed will a development proposal be cleared with the authority from a floor risk perspective. Although not a legally binding decision, it is very rare for an authority to ignore the opinion of the EA in reaching a decision about the acceptability of a development proposal on hydrological grounds.

These requirements to fully consider flood risk in a systematic manner both for producing land use plans and in evaluating all development applications are set out at the national policy level in a document called *'Planning Policy Statement 25 Development and Flood Risk'* (Department of Communities and Local Government, 2010).

With this approach England's land use planning system has successfully integrated flood risk reduction methods into its procedures to ensure new development does not increase flood risks for others and is not itself sited in risky locations. Problems, however, remain for existing, older built form development which is often located in areas which now, due to hydrological changes and the effects of climate change, are at

heightened risk from surface water, tidal and fluvial flooding. The EA also has a mandate to address these hazards, although mitigation measures are often structural and government funding is not always available to implement them.

3.5 Cambodia: Integrating DRR into the Education Sector

In 2007, ADPC funded a project aimed at integrating DRR in to the curriculum of secondary schools in Cambodia, where it was previously absent, and which has now been rolled out at the national level.

ADPC funded the creation of a Technical Working Group comprised of education and DRR experts from Cambodia's Ministry of Education, Youth and Sport (MEYS) and the National Committee for Disaster Management respectively. Utilising the expertise from both sectors, a DRR curriculum was written for Grade 8 pupils specific to the hazards faced in Cambodia. This was submitted to UNICEF, Save The Children and other NGOs for comment and the finalised programme was approved by the MYES. Topics covered include drought, floods, earthquakes and hurricanes, and volcanic eruptions and these were integrated into the subject areas of 'Geography' and 'The Earth'.

The curriculum was trialled at 10 schools across three provinces, Kandal, Prey Veng & Kratie. A total of 847 pupils were taught the DRR module. Teachers and local officials received training on the programme prior to its implementation, with a total of 60 teachers and 38 officials trained. The trials were monitored by member of the Technical Working Group and other invited observers. Some lesson plans were modified as a result of this process. A specific text book on hazards was produced for the students, and a teachers' manual developed to assist with delivering the curriculum

Based on this pilot scheme and the tools developed within it, Cambodia's Strategic National Action Plan (SNAP) now includes the mainstreaming of this DRR programme into the education sector as a key action and the government is committed to expanding the programme across the country. To action this policy requirement, the MEYS has issued a directive (order number 555/2008) to all district and provincial heads of education departments to disseminate and implement the DRR curriculum at the secondary school level (ADPC, 2008).

Whilst undoubtedly this programme is likely to need further training of teachers and officials to perpetuate successfully, ADPC has acknowledged this will require a further phase of their project. This represents a promising beginning to DRR integration within the education sector at both the national policy and local implementation levels.

3.6 Nepal: The Difficulties of Integration without Legislative or Financial Backing

The International Decade for Natural Disaster Reduction was instigated to increase the activities related to disaster risk management in Nepal. Before 1982, Nepal did not have laws to specifically control and minimise loss caused by disaster. The first report for Disaster Preparedness and Relief in Nepal (1972) was prepared by Fred Shepardson in 1972 (Shepardson, 1972). However, it was only in 1982 that the first Natural Disaster Relief Law was promulgated in the country, based on Shepardson's report (GoN, 1982). This law has been amended three times since, the last amendment having been finalised in 1992. The latest amendment was proposed to the interim parliament in May 2007, detailing only minor changes, but as yet, has not been formally approved by the parliament (Constitution Assembly) and has only been 'theoretically agreed' at a cabinet meeting on 1st February 2011 in Kathmandu (Aryal, 2011).

Currently, Nepal along with another 167 nations and multilateral institutions, is formally committed to mainstreaming disaster risk reduction into development planning as a signatory of the Hyogo Framework for Action, 2005-2015 (HFA). In September 2009, the National Strategy for Disaster Risk Management in Nepal (NSDRMN) was approved at a meeting of the Council of Ministers. It specifies a comprehensive, holistic approach to disaster risk management, which is intended to move Nepal towards the cutting edge of best international practice. However, this legislative document is yet to be approved by the Nepalese Constitution Assembly (CA) for a legal mandate in Nepal. Whilst Nepal intends to use this National Strategy for Disaster Risk Management to guide development planning across all sectors, without legislative power it is not mandatory for Ministries to comply with its requirements and they are not able to attribute internal government budgets to integrate its directives.

Despite this delay in policy enactment, in October 2009, the Nepal Risk Reduction Consortium was formed to support the government of Nepal in developing a long term Disaster Risk Management Action Plan, building on the NSDRM. The consortium was initiated jointly by key international donors, such as the Asian Development Bank (ADB), International Federation of Red Cross and Red Crescent Societies (IFRC), United Nations Development Programme (UNDP), United Nations Organisation for Humanitarian Affairs (UNOCHA), United Nations International Decade for Disaster Risk Reduction (UNISDR) and World Bank, in conjunction with the government and non-governmental communities of Nepal.

Since its inception, the Consortium has initiated a multi stakeholder participatory process with the Government of Nepal and civil society organisations to identify short to medium term disaster risk reduction priorities that are both urgent and viable within the current institutional and policy arrangements of the country.

Based on Government priorities and the multi stakeholder discussions, the Consortium members and government have developed a draft programme proposal, identifying five action areas in line with the key considerations outline in the 'Hyogo Framework of Action 2005-2015: Building the Resilience of nations and Communities to Disasters'. The five action areas are:

i. School and hospital safety: structural and non-structural aspects of making schools and hospitals earthquake resilient.
ii. Emergency preparedness and response capacity
iii. Flood management in the Koshi river basin
iv. Integrated community based disaster risk reduction / management
v. Policy/ Institutional support for disaster risk management (NRRC, 2011)

The estimated total budget of the proposed programme is US$133million (NRRC, 2011). As of April 2011, only US$19million has been pledged by various donor agencies for realising the programme objectives. Given the current global financial situation, it is questionable what amount of additional external support will be received and therefore what proportion of the programme can actually be implemented.

There is also evidence that, whilst at the national level disaster management policy development has been relatively strong (notwithstanding the delay in enactment), this has not been integrated into the cross-sector process of development. Furthermore, at the local level there is only sparse understanding of disaster management and only sporadic implementation of disaster risk reduction policies (Jones et al., forthcoming).

This case study illustrates the difficulties of integrating disaster risk reduction policy throughout the levels of government if sustainable funding streams to support it are not in place:

- it is evident that without a legislative framework mandating the incorporation of disaster management policy, under-funded government departments are not able to justify integration;
- without financial backing, despite the development of a rigorous programme to identify areas where DRR needs to be focused, the country cannot afford to implement these ideas;
- without support for local level knowledge resources to facilitate policy integration at this level of government, DRR strategies are unlikely to be comprehensively introduced.

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