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Adaptation to climate change - frontrunner in strengthening local capacity toward sustainable development

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1. Introduction - Scientific background and policy decisions in UNFCCC

Scientifically and politically, adaptation to the climate change emerges as one of the most urgent and critical issues contemporary society to prepare for. The Working Group I of IPCC TAR recognized around 0.6 degree temperature rise observed in the past century, indicated stronger evidence of human intervention to this rise, and forecasted 1.4-5.8 degree temperature rise toward the end of 21st century. Still, the projection includes high uncertainty in human response to the climate change and due to the different results of general circulation models.

Working Group II showed clear evidences that climate change has already been affecting to some of the natural ecological system worldwidely. They intensively summarized anticipated climate change impacts to life supporting system of the earth, including human society. And they concluded that, even though some sectors, countries and ecosystems may have benefit from climate change at its lower level, there will be no winner in the world when it is accelerated and enters into high level of change. They cautioned the possibility of abrupt irreversible change of dynamics of earth, triggered by climate change. There still remains great uncertainty in estimating specific impacts (especially on extreme events) to specific place because of lack of scientific methodology and observed data.

Working Group III developed future GHG emission scenario, suggesting early action toward sustainable development may prevent rapid change, but continuation of energy intensive lifestyle and production system may induce high level and rapid rate climate change.

All of those findings and warning from scientific society suggest that we need to deal with climate change from risk management point of view. Not only mitigating climate change, but also deliberate preparation for adapting to this proceeding and anticipated climate change should be started now, at least as a safety net, based on the precautionary approach.

The UNFCCC Conference of the Parties, at its 7 th meeting in 2001, reflecting those scientific conclusions, decided to establish newly Adaptation Fund connected to CDM activities,

Least Developed Countries Fund for the introduction of National Action Plan for Adaptation and Special Climate Fund partly usable for adaptation.

2. Adaptation strategy in the context of sustainable development:

In summer 2002, the World Summit for Sustainable Development recognized that changes on Earth's climate and its adverse effects are a common concern of human kind. And that all countries, particularly developing countries including the least developed countries and small island developing States, face increasing risk of negative impact of climate change.

To maintain sound human life, to secure stable production base and to preserve natural resources, while living with changing global environment such as caused by global warming, are the ultimate purpose of adaptation strategy. Strategy is the criteria and implementing procedure to accomplish this purpose by effective allocation of available resources, such as private and official fund, scientific and managerial knowledge and individual and institutional human effort. The strategy should be based and endorsed by sound and updated science and technology.

3. Basic characteristic of adaptation to be considered in establishing strategy

In general, any adaptation strategy should take its grounding on the following specific characteristics (especially in contrast with mitigation strategy) of adaptation to climate change. Following are a number of characteristics which should be considered in the formulation of the strategy.

(i) *The object is the local environment as a whole, where human and nature coexist and consist of the vernacular identity which needs to be sustained*: A holistic view of this local environment is essential. Since adaptation measures, in the main, are likely to be site specific, attention should be paid to the situation of local environment, such as the pressures from change, vulnerability and the resilient capacity of nature and society. The strategy should be flexible so as to respond to this diversity, as well as integrated in orientation. Generalization of adaptation policy is not always appropriate.

(ii) *Adaptation relates to global change or multiple pressure issues*: Climate change is only one of a number of global changes – the others include land-use and land-cover change; soil and water pollution and degradation (including desertification), and air pollution; diversion of water to intensively managed ecosystems and urban systems; habitat fragmentation; selective exploitation of species; the introduction of non-native species;

and stratospheric ozone depletion, which are taking place. The strategy should therefore be multi-purpose, simultaneously addressing other issues in an integrated way.

(iii) *Adaptation is response to local impacts caused by global scale phenomena*: The Adaptation strategy will require fusion of a "top-down" approach that identify impacts from global scale climate change, and "bottom-up" approach rooted in local, national and regional experiences. The former coming in the main from scientific knowledge, and the latter mainly directed towards enhancement of resilience capacity.

(iv) *Decisions are made under scientific and societal uncertainty*: Current science has not progressed enough to forecast plausible patterns of local impacts, to identify existing vulnerability and to evaluate the effectiveness of responding measures to climate change. The adaptation strategy should not be deterministic but rather be flexible and based on the risk management concept.

(v) *Wide scope insight is needed in terms of exposure unit and associated stakeholders*: Climate change gives sequential impacts, such as from water resources to agriculture, food industry and world trade of foods. Consideration should be given to adaptation measures in individual stages, as well as integrating policies throughout the stages. It should also be recognised that stakeholders' options also differ stage by stage, such as personal efforts, farm level management, local and national governments' regional development plan.

(vi) *Actors of adaptation are diversified*: Unlike mitigation, adaptation issues address a wide cross-section of stakeholders at every level of society. In designing adaptation measures, it will be critical to have stakeholders' involvement in early stage of planning, if establishing and implementing adaptation measures are to be successful.

(vii) *Impacts of climate change may be non-linear, and are often accompanied by thresholds (showing large changes) and delays (inertia)*: Generally, climate impacts proceed slowly but steadily, although some abrupt changes are anticipated. Taking into consideration a large inertia which exists in climate systems responses and in social reaction and in the decision making process the first stage scoping work, at least, needs to be started as early as possible. The strategy should have long-term perspective and be anticipatory, stepwise and adaptive. The decision making process should be sequential and flexible, and renewed continuously by feeding back updated scientific information.

(viii) *Long-lived nature of impacts and adaptation*: The impacts of climate change will be long-term (e.g. sea level rise for thousands of years). The responding measures should not be a one-off intervention. Continuous follow-up efforts, stakeholders involvement, monitoring and evaluating effectiveness of adaptation policy are indispensable.

(ix) *Adaptation must be economically efficient, contribute to the advancement of social and environmental objectives*: Adaptation activities should be designed to support national economic objectives including social objectives and should be compatible with long-term environmental objectives.

4.. Challenges in Designing an Effective on Adaptation Strategy – Filling The Gaps

Taking into consideration foregoing specific characteristics of impacts of and adaptation to climate change, a number of scientific and socio-managerial gaps remain to be filled. The adaptation strategy should be formulated in such a way so as to enable these gaps to be addressed.

(a) Scientific and Methodological Challenges

(i) ***Fusion of "top-down" and "bottom-up" approaches***: The local climate change scenario is usually provided by regional climate models (RCMs) which are down-scaled from the global scale General Circulation Model (GCM). Adaptation, on the other hand, is site specific. Each local has its own vernacular environmental and societal values, tradition and institutions and the appropriateness of adaptation policy and measure differs from place to place. Discourse between these two approaches aimed at establishing a common information base is an urgent priority.

(ii) ***Framework for Adaptation***: The establishment of a framework for an evolutional adaptation approach using the risk management concept is also critical considering the existing uncertainty and delay. As a consequence, the "risk management" approach should form the basis of the strategy. In adopting this approach, a wide range of responding measures could be prepared, not in the context of rigid and temporal planning, but a stepwise continuing decision process which is flexible in selecting best path in response to updated scientific knowledge and social changes.

(iii) ***Benefiting from Synergies***: Structuring synergetic adaptation policy with other global and regional environmental issues, such as biodiversity, soil erosion, inland water and urban pollution. Should be an important component of the Adaptation Strategy.

(iv) ***Value judgement and quantification***: It is necessary to establish criteria how to evaluate and respect local values (indirect, existing, bequest, option values) and ensure their complementarity with wider common and global value as well as to characterize and quantify them into indicators usable for decision-making.

(v) ***Establishing criteria for judging rationale of climate investment, in place of incremental cost***: How to quantify global benefits of local adaptation? How is the baseline set for quantifying benefits of adaptation measures?

(vi) ***Indicators***: Establishing methods of monitoring and assessing effectiveness of adaptation measures, including development of indicators is necessary.

(vii) ***Integration of socio-economic consideration into adaptation***: Consideration should be given, not only to the technical measures, but also socio-economic measures based one existing local tradition knowledge, customs and institutional frameworks.

(b) Social and managerial challenges

(i) ***Development of participatory procedures from the early stage of adaptation policy-making***: Stakeholders' participatory processes work effectively in finding local values and vulnerable points and autonomous reactions on the individual level. This effectively strengthens and ensures the role of stakeholders in the implementation stages and sustainability of adaptation, and fosters *in situ* resilient capacity as well. Active information dissemination among stakeholder is also critical.

(ii) ***Development and dissemination of user friendly guidance***: Practical guidance in designing a framework for adaptation and setting priorities among alternative measures, targeted both to local people and donors and collaborators, is strongly required. Many of the technologies applicable to adaptation are rather conventional and existing ones. The guidelines to select on appropriate combination of them which fits the local environmental an societal condition is helpful.

(iii) ***Integration into sustainable development efforts of local/regional/national government****:* The final goal of any adaptation strategy is to sustain human, environmental and economic development. Any adaptation policy should therefore be harmonized with regional socio-economic development plans. Institutional structures and processes (i.e. disaster plans; drought mitigation plans, sectoral plans etc.) are already in place in most countries and these offer opportunities for the incorporation of adaptation measures into mainstream development.

Three categories of activities appear to be important. In prioritizing adaptation projects, being quite different from the mitigation case, long-lived sustainability of the project based on the sound scientific knowledge is so important. For the sustainability of the projects, just as in many projects for biodiversity protection, local capacity building is the key component of the adaptation.

(i) ***Science and Technology***: The gaps in scientific knowledge suggest there is a need to prioritize, plan, implement and evaluate adaptation options indicates as well as the strengthening and/or development of methodologies. In this regard, targeted research should be promoted. Lack of historical and rigid data in every sector hinders scientific assessment. Scientific guidelines for selecting and implementing adaptation measures newly edited in consideration to the place based methodology helps practitioners.

(ii) ***Capacity Building***: Enhancing local resilience capacity to cope with climate variability and change is suggested to be the core. It is also the most flexible way of responding to uncertain future climate. Not only should public participation be strengthened but also enhancement of local scientific knowledge and utilization of indigenous knowledge. It is important to ensure the participation of local experts and people in the planning of project at an early stage.

(iii) ***Investment Interventions***: Hard type investment works efficiently when incorporated into mainstream development. Assessment and consideration to the local and national size urban planning, river basin management, integrated coastal zone management needs to be well preceded to concrete investment. Deliberative stepwise screening is necessary so as to avoid mal-adaptation caused by irreversible hard type investments.

Since the integration of adaptation measures into mainstream development will necessitate a multi-stakeholder approach, specific consideration should be given to the role of the private

sector in adaptation planning and implementation. In most developing countries, private investment is far greater than official development assistance.