Bonn, 06.02.2017

Submission of United Nations University
Institute for Environment and Human Security (UNU-EHS) to the

Call for submissions in the area of ecosystems, interrelated areas such as water resources and adaptation under the Nairobi Work Programme

in the thematic areas

A) lessons learned and good practices in relation to adaptation planning processes that address ecosystems and interrelated areas such as water resources; and
B) tools for assessing the benefits of mitigation and adaptation to enhancing resilience and emission reductions that ecosystem-based adaptation provides.

A) Lessons learned and good practices in relation to adaptation planning processes that address ecosystems and interrelated areas such as water resources

Dr Fabrice Renaud served as editor for two books directly related to the call. The books can be provided to the NWP team. They serve as a rich source of information on ecosystem based measures.

Ecosystem-Based Disaster Risk Reduction and Adaptation in Practice, ed. Renaud, Fabrice G., Sudmeier-Rieux, Karen, Estrella, Marisol and Nehren, Udo (Switzerland: Springer International Publishing, 2016).

The role of ecosystems in disaster risk reduction, ed. Renaud, Fabrice G., Sudmeier-Rieux, Karen and Estrella, Marisol (Tokyo: UNU Press, 2013).

Further relevant work:

1) *Brondizio, Eduardo, Foufoula-Georgiou, Efi, Szabo, Sylvia, Vogt, Nathan,* ***Sebesvari, Zita, Renaud, Fabrice G.****, Newton, Alice, Anthony, Edward, Mansur, Andressa V., Matthews, Zoe, Hetrick, Scott, Costa, Sandra M., Tessler, Zachary, Tejedor, Alejandro, Longjas, Anthony and Dearing, John A. (2016). Catalyzing action towards the sustainability of deltas. Current Opinion in Environmental Sustainabilit, 19, 182-194*

This research paper was co-authored by UNU-EHS scientists and highlights that river deltas play a central role in food and water security but are increasingly facing hazards such as submergence, riverine and coastal flooding, and coastal erosion. Deltas as sentinels of regional and global changes offer opportunities for new collaboration between and within the natural and social sciences, involving regional stakeholders for knowledge co-production. To illustrate these points, the paper present a review of three research domains implemented in the Belmont Forum funded DELTAS project: advancing biophysical classifications of deltas, understanding deltas as coupled social–ecological systems, and analyzing and informing social and environmental vulnerabilities in delta regions.

Relevance for the call: the project called for a systematic integration of ecosystems into the vulnerability and risk assessments and also presented approaches for the successful and systematic integration.

Access: PDF version of the paper is attached (No_1). The journal doesn't provide open access; thus the PDF cannot be freely shared.

http://www.sciencedirect.com/science/article/pii/S1877343516300264

2) ***Sebesvari, Zita**, Foufoula-Georgiou, Efi, Harrison, Ian, Brondizio, Eduardo, Bucx, Tom, Dearing, John A., Ganguly, Dipnarayan, Ghosh, Tuhin, Goodbred, Steven L., **Hagenlocher, Michael**, Hajra, Rituparna, Kuenzer, Claudia, Mansur, Andressa V., Matthews, Zoe, Nicholls, Robert J., Nilsen, Kristine, Overeem, Irina, Ramachandran, Purvaja, Rahman, Munsur Md., Ramachandran, Ramesh, **Renaud, Fabrice G.**, Robin, R. S., Subba Reddy, Bonthu, Singh, Gulab, Szabo, Sylvia, Tessler, Zachary, van de Guchte, Cees, Vogt, Jürgen and Wilson, Carol A. (2016). Imperatives for sustainable delta futures. Brief for GSDR. Sustainable Development Knowledge Platform.*

This science brief was submitted for the 2016 update of GSDR. It highlights the central role of river deltas to research and policy in the context of environmental change and regional sustainability and formulates science-based key messages for delta sustainability.

Relevance for the call:
Some key statements regarding adaptation in the context of ecosystems are as follows:

- Investment in natural capital supplied by relatively intact deltaic ecosystems provides the least expensive and most sustainable management opportunities.
- Implementing improved environmental regulations for resource use and designating protected areas for conservation measures are priorities.
- Assessment frameworks must capture social, ecological, and geophysical elements and their interactions; currently such integrated assessments are rare.
- Vulnerability and risk information can be used for adaptation planning as well as for disaster risk reduction, e.g. for planning of evacuation routes.
- With effective delta planning, ecologically-informed improvements to infrastructure, and investments in social well-being, long-term sustainability of deltas can be achieved.

Access: PDF version of the science brief is attached (No_2).

The science brief can be freely downloaded at

https://sustainabledevelopment.un.org/content/documents/972032_Sebesvari_Imperatives%20for%20sustainable%20delta%20futures.pdf

3) *Bhaduri, Anik, Bogardi, Janos, Siddiqi, Afreen, Voigt, Holm, Vörösmarty, Charles, Pahl-Wostl, Claudia, Bunn, Stuart, Shrivastava, Paul, Lawford, Richard, Foster, Stephen, Kremer, Hartwig, **Renaud, Fabrice** G., Bruns, Antje and Rodriguez Osuna, Vanesa (2016). Achieving Sustainable Development Goals from a Water Perspective. Frontiers in Environmental Science, 4(64), 1-13*

This review article was co-authored by a UNU-EHS scientist and highlights the relevance of water in reaching the SDG but also discusses implications for adaptation. Among others the role of water storage infrastructure is discussed in light of adaptation needs. Longer droughts and larger floods would imply more water storage volume to enhance coping capacity. Reservoirs which are well

designed and operated as multipurpose facilities can contribute to the achievement of several SDGs, including ecosystem-oriented ones. Improved energy, food and water security, but also disaster risk mitigation and securing environmental flows downstream can be attributed to dams and reservoirs, however, it often comes at the price of deterioration of the natural features of freshwater ecosystems.

Relevance for the call: This review paper can contribute with arguments and thoughts to link between (ecosystem based) adaptation, water resources and SDGs.

Access: PDF version of the paper is attached (No_3).

The paper can be freely downloaded at

http://journal.frontiersin.org/article/10.3389/fenvs.2016.00064/full

4) *Salvaterraa, Tânia, Allenbachb, Karin, Hobsonc, Peter, Ibischd, Pierre L., Korne, Horst, Mysiak, Jaroslav,* ***Renaud, Fabrice G.*** *and Pulquérioa, Mário (2016). Policy brief: Exploring the potential of ecosystem-based approaches – Ecosystem-based Adaptation and Ecosystem-based Disaster Risk Reduction. Policy brief with proceedings from a PLACARD session convened as part of the 4th Adaptation Futures Conference, 1-4*

This policy brief was co-authored by UNU-EHS scientists and highlights that Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR) share similar goals but differ in the terminology used, tools and methods, and the audience targeted to carry out the planning and implementation of practices. There is an urgent need to integrate the activities of both practices under a unifying concept and set of "principles-to-practice" strategies. The use of 2 ecosystem-based approaches in dealing with the complex problems of climate change offers opportunities for developing novel strategies to adapt to rapid change and to reduce risk. From a practical, pragmatic perspective, and considering climate hazards, the divisions between Ecosystem-based Adaptation (EbA) and Ecosystem-based DRR (Eco-DRR) can be counterproductive. As, per definition, both approaches fully embrace the sustainable ecosystem management approach, it would make common sense to dissolve the divisions between them.

Relevance for the call:

The policy brief delivers arguments why it makes sense to align Eco-DRR and EbA communities and strategies. It could be important to highlight and eventually foster this convergence further.

Access: PDF version of the policy brief is attached (No_4).

The policy brief can be freely downloaded at

http://www.placard-network.eu/wp-content/PDFs/NBS-policy-brief.pdf

5) ***Snorek, Julie, Renaud, Fabrice G. and Kloos, Julia*** *(2014). Divergent adaptation to climate variability: A case study of pastoral and agricultural societies in Niger. Global Environmental Change, 29, 371-386*

This paper is based on a 3-year research project at UNU-EHS. It introduces the concept of divergent adaptation to describe a situation in which the success of one individual or group's adaptation causes a subsequent reduction in another individual or group's adaptive capacity. The term illustrates how the process of adaptation has the ability to bring about unequal access to entitlements, institutions, and resources; change social networks; and limit one's options to respond to climatic hazards. Transformation, cooperation and conflict are possible outcomes of divergent adaptation. When there are multiple users of collective resources in a shared social ecological system, divergent adaptation can transform the social reality, causing changing norms, institutions, and patterns of conflict and cooperation.

Relevance for the call:

By recognizing and understanding divergent adaptation and how to enhance adaptive capacity for multiple users of collective resources, institutions of governance can limit the activities that contribute to divergence and provide a more adaptive form of management. Adaptations that build social capital and are not divergent, such as protection of collective water and forest resources, soil and erosion management, and natural regeneration, should be supported by institutions and government development programs.

Access: PDF version of the paper is attached (No_5). The journal doesn't provide open access; thus the PDF cannot be freely shared.

http://www.sciencedirect.com/science/article/pii/S0959378014001198

6) ***Renaud, Fabrice G., Le, Thi Thu Huong, Lindener, Carina,*** *Guong, Vo Thi and* ***Sebesvari, Zita*** *(2014). Resilience and shifts in agro-ecosystems facing increasing sea-level rise and salinity intrusion in Ben Tre Province, Mekong Delta. Climatic Change. 133, pp 69–84.*

In coastal areas of the Mekong Delta in Vietnam the influence of salinity intrusion on agro-ecosystem was studied along spatial and temporal salinity gradients. Agricultural activities have changed in the last decades, mainly driven by national-level policies. At present, the development of engineered infrastructures is favoured as adaptation measure to increasing salinity intrusion whereas complementary or alternative solutions to increase the resilience of social-ecological systems with respect to salinity intrusion exist. These include regeneration of coastal ecosystems, agronomic measures, upstream flow control and shifts in agro-ecosystems. The latter would increasingly enable farmers to work under the influence of both saline and freshwater systems allowing income diversification.

Relevance for the call:

The paper discusses alternative non-infrastructure related approaches to increase the resilience of social-ecological systems with respect to salinity intrusion. It provides a table summarizing these approaches and also describes potential implications. It recognizes that national authorities have an opportunity to change the business as usual mode of tackling water-related problems including extreme events in the Mekong Delta through infrastructure development by looking at these alternative solutions.

Access: PDF version of the paper is attached (No_6). The paper can be freely downloaded at

http://link.springer.com/article/10.1007/s10584-014-1113-4

7) ***Gain, Animesh K.,*** *Giupponi, Carlo and* ***Renaud, Fabrice G.*** *(2012). Climate change adaptation and vulnerability assessment of water resources systems in developing countries*. *Water, 4, 345-366*

In this study, the evolution of approaches to vulnerability assessment related to water resources was reviewed. Research gaps were identified and a generalized assessment framework was developed to overcome these gaps is developed. A feasibility study is then presented in the context of the Lower Brahmaputra River Basin (LBRB). The results of the feasibility study identify the current main constraints (e.g., lack of institutional coordination) and opportunities (e.g., adaptation) of LBRB.

Relevance for the call:

The results of this study can be helpful for innovative research and management initiatives and the described framework can be widely used as a guideline for the vulnerability assessment of water resources systems, particularly in developing countries.

Access: PDF version of the paper is attached (No_7). The paper can be freely downloaded at

http://www.mdpi.com/2073-4441/4/2/345

8) *Sudmeier-Rieux, Karen, Fra Paleo, Urbano,* ***Garschagen, Matthias****, Estrella, Marisol,* ***Renaud, Fabrice*** *G. and Jaboyedoff, Michel (2015). Opportunities, incentives and challenges to risk sensitive land use planning: lessons from Nepal, Spain and Vietnam. International Journal of Disaster Risk Reduction, 14, 205–224.*

This paper is co-authored by two UNU-EHS researchers and has responded to the GAR 2013 question: “how do investment decisions in the private sector (in a context of incentives and regulation by the public sector) increase levels of disaster risk and, in some cases, transfer risk from private investors to governments and to other sectors of society?” It focuses mainly on risk-sensitive land use planning. Meeting human needs and improving quality of life are key drivers and the strongest incentives for change. Yet to achieve these goals, support from NGOs, public and private sectors is needed to increase the capacities of local and national governments to provide incentives and regulations for the private sector and to ensure safe places for people to live. One of the strongest arguments in favor of risk sensitive land use planning is its cost-effectiveness, considering the high costs of structural measures to reducing risk. It concludes that more effective risk reduction is possible through improved spatial planning.

Relevance for the call:

The paper points out that risk-sensitive land use planning may include ecosystem-based approaches as part of integrated planning to mitigate hazards, reduce vulnerabilities by providing livelihood resources and even exposure when dangerous areas are converted to green belts.

Access: PDF version of the paper is attached (No_8). The journal doesn't provide open access; thus the PDF cannot be freely shared.

http://www.sciencedirect.com/science/article/pii/S221242091400079X

9) ***Sebesvari, Zita, Le, Thi Thu Huong and Renaud, Fabrice G.*** *(2011) "Climate change adaptation and agrichemicals in the Mekong Delta, Vietnam" in Environmental change and agricultural sustainability in the Mekong Delta: vol. 45, ed. Stewart, M. A. and Coclanis, P. A., Dordrecht: Springer (Advances in Global Change Research), 219-239.*

Predicted impacts of climate change such as sea level rise, greater seasonal variability in precipitation and river flows, and elevated temperature and CO2 concentration will likely influence the agricultural landscape and thus agrichemical use. Against the background of the anticipated climate change impacts in the Mekong Delta (Vietnam), this book chapter draws a scenario for future agrichemical use and attendant environmental problems. This scenario is achieved through a review of the main climate change-mediated drivers for agrichemical use, with a focus on land-use changes and changes in pest and disease patterns. In addition, the chapter identifies possible adaptation measures that may be implemented by the agricultural sector in the Mekong Delta and explores the potential environmental effects of these adaptation strategies.

Relevance for the call:

It is often overlooked that adaptation measures in agriculture might also impact pollution patterns and related risk for environmental and human health. The chapter suggests to put more emphasis on integrated pest management (IPM) approaches to grow rice with the least possible disruption to agro-ecosystems and to encourage natural pest control mechanisms to reduce pollution. IPM can be seen as an ecosystem-based measure to adaptation in an agricultural setting such as the Mekong Delta in Vietnam.

Access: PDF version of the paper is attached (No_9). The journal doesn't provide open access; thus the PDF cannot be freely shared.

http://link.springer.com/chapter/10.1007/978-94-007-0934-8_13?no-access=true

B) Tools for assessing the benefits of mitigation and adaptation to enhancing resilience and emission reductions that ecosystem-based adaptation provides

10) ***Sebesvari, Zita, Renaud, Fabrice G., Haas, Susanne****, Tessler, Zachary,* ***Hagenlocher, Michael, Kloos, Julia,*** *Szabo, Sylvia, Tejedor, Alejandro and Kuenzer, Claudia (2016). A review of vulnerability indicators for deltaic social–ecological systems. Sustainability Science (Special Issue), 1-16*

The sustainability of deltas worldwide is under threat due to the consequences of global environmental change (including climate change) and human interventions in deltaic landscapes. Understanding these systems is becoming increasingly important to assess threats to and opportunities for long-term sustainable development. In this paper we proposed a simplified, yet

inclusive social–ecological system (SES)-centered risk and vulnerability framework and a list of indicators proven to be useful in past delta assessments. Based on the reviewed studies, we identified disparities in the availability of indicators to populate some of the vulnerability domains of the proposed framework, as comprehensive social–ecological assessments were seldom implemented in the past. Even in assessments explicitly aiming to capture both the social and the ecological system, there were many more indicators for social susceptibility and coping/adaptive capacities as compared to those relevant for characterizing ecosystem susceptibility or robustness. Moreover, there is a lack of multi-hazard approaches accounting for the specific vulnerability profile of sub-delta areas. We advocate in this paper for more comprehensive, truly social–ecological assessments which respond to multi-hazard settings and recognize within-delta differences in vulnerability and risk.

Relevance for the call:

In total, 236 vulnerability indicators were identified through a structured review of peer-reviewed literature performed for three globally relevant deltas—the Mekong, the Ganges–Brahmaputra–Meghna and the Amazon. These are meant to serve as a preliminary "library" of potential indicators to be used for future social-ecological vulnerability assessments. Such assessments could make use of the proposed framework and list of indicators as a starting point and amend it with new indicators that would allow capturing the complexity as well as the multi-hazard exposure in a typical delta SES.

Access: PDF version of the paper is attached (No_10). The journal doesn't provide open access; thus the PDF cannot be freely shared.

http://link.springer.com/article/10.1007/s11625-016-0366-4

11) ***Kloos, Julia, Asare-Kyei, Daniel, Pardoe, Joanna and Renaud, Fabrice G.*** *(2015). Towards the Development of an Adapted Multi-hazard Risk Assessment Framework for the West Sudanian Savanna Zone. UNU-EHS Working Paper. UNU-EHS.*

This UNU-EHS working paper suggests an approach for linking resilience and vulnerability in a common framework for risk assessment. It accounts for societal response mechanism through coping, adaptation, disaster risk management and development activities which may foster transformation or persistence of the social ecological systems. Building on the progress made in multi-hazard assessments, the framework is suitable for analyzing multiple-hazard risks and existing interactions at hazard and vulnerability levels.

Relevance for the call:

The framework presented allows researchers and practitioners to undertake comprehensive risk and vulnerability assessments critical for strengthening climate change adaptation initiatives. The framework considers both the social and the ecological elements of the systems and may guide also ecosystem-based adaptation responses.

Access: PDF version of the working paper is attached (No_11). The paper can be freely downloaded at

https://ehs.unu.edu/news/announcement/towards-the-development-of-an-adapted-multi-hazard-risk-assessment-framework-for-the-west-sudanian-savanna-zone.html#files

12) ***Asare-Kyei, Daniel, Kloos, Julia and Renaud, Fabrice G. (2015).*** *Multi-scale participatory indicator development approaches for climate change risk assessment in West Africa. International Journal of Disaster Risk Reduction, 11, 13-34*

This publication is the outcome of a three year research project in the frame of WASCAL at UNU-EHS- A multi-scale participatory process was used to extend the classical approach of indicator development for flood and drought risk assessment in West Africa. It provides a "West African Comprehensive Indicator Set" for flood and drought risk assessment in a coupled social-ecological system under climate change.

Relevance for the call: the paper provides a methodology for risk and vulnerability assessment in multi-risk environments (here drought and flood) in the context of climate change. The identification of risk and vulnerability patterns in a spatially explicit and scale-resolved manner informs adaptation decisions. Since the approach incorporates social and ecological indicators, it allows for the identification of ecosystem-based adaptation responses. It also points out that more emphasis should be paid to local consultations and co-development of indicators in vulnerability and risk assessment that is supposed to serve the very people on whose behalf the assessment is done.

Access: PDF version of the paper is attached (No_12). The journal doesn't provide open access; thus the PDF cannot be freely shared.

http://www.sciencedirect.com/science/article/pii/S2212420914000995