Call for submission on adaptation actions and plans that could enhance economic diversification and have mitigation co-benefits[1]

We thank you in advance for filling out this template with concise, evidence-based information and for referencing all relevant sources. There are several sections in the template: please fill the sections that are relevant to the work of your government or organization. As you will see on the last page of the document, more detailed information on case studies, tools/methods and other knowledge resources for dissemination through the Adaptation Knowledge Portal is welcome, but optional.

Name of the organization or entity:

United Nations Development Programme

Type of organization:

Please choose as appropriate:

- ☐ Local government/ municipal authority
- ☐ Intergovernmental organization (IGO)
- ☐ National/public entity
- ☐ Non-governmental organization (NGO)
- ☐ Private sector
- ☐ Regional center/network/initiative
- ☐ Research institution
- ☒ UN and affiliated organization
- ☐ University/education/training organization

Scale of operation:

- ☐ Global
- ☐ Local
- ☐ National
- ☐ Regional
- ☒ Subregional
- ☐ Transboundary

City(ies)/Country(ies)/Rgion/s of operation (if appropriate):

Description of relevant actions/plans or research:

Please describe the actions or plans that your entity has implemented. In case your entitycarried out research on such actions/plans, please describe them.

The Capacity Building Programme on the Economics of Climate Change (ECCA) was a three-year programme, comprised of a series of technical trainings interspersed with mentor-assisted in-country applied work to enable trainees from 10 countries in Asia – Bangladesh, Cambodia, Indonesia, Lao PDR, Maldives, Mongolia, Nepal, Philippines, Sri Lanka, Thailand, Viet Nam - to master key economic concepts and tools for adaptation planning and decision-making. The ECCA Programme was first launched in October 2012 by the United Nations

[1] FCCC/SBSTA/2016/2, paragraph 15 (d)

Development Programme (UNDP) in partnership with USAID, Yale University, the Asian Development Bank and Global Water Partnership. The three-year capacity-building programme was conceived with the aim of enhancing the technical know-how of governments to formulate economically efficient development plans, inform climate smart policies and build strong National Adaptation Plans (NAPs).

In 2017, the ECCA programme transitioned into Phase Two, in collaboration with the Asian Institute of Technology.

ECCA addressed a consensus reached during a regional stakeholder consultation that a more comprehensive approach to mainstreaming climate change risks into planning processes was needed to ensure economically efficient climate change strategies at the sectoral, sub-national and national levels. The innovative program aimed to identify gaps in capacity development needs in an area that is critical for helping countries to formulate national adaptation plans and access climate finance.

The programme targeted mid- and senior-level public sector officials from planning, finance, environment and other key ministries responsible for formulating, implementing and monitoring climate change programmes. They were grouped into multi-disciplinary country teams. The country teams participated in four regional workshops, which provided training on theory and the practical application of cost-benefit analysis, and introduced participants to forecasting, modelling and sectoral analysis, looking into country-specific institutional development plans, within the context of ongoing and new initiatives. Each regional training was interspersed with fieldwork application, guided by economists who served as mentors to the country teams. Together, these two principal programme components provided building blocks to guide participants through the theory, principles and application techniques of economic analysis.

Country teams have now begun reporting the results of their training and in-country application. With this training and hands-on experience, it is expected that the members of the country teams will play pivotal roles in mainstreaming climate considerations into future development planning, ultimately seeking to institutionalize these important analytical skills.

The training activities, together with the country reports and the regional report, which compiles the individual country reports to take a view of regional considerations in the agriculture sector, has contributed to a key area of technical assistance required by countries, as per the United Nations Framework on the Convention of Climate Change's (UNFCCC) guidelines for countries on the National Adaptation Plan (NAP) process – a process established under the Cancun Adaptation Framework (CAF) to help countries identify their medium- and long-term adaptation needs.

Description of relevant tools/methods:

Please describe the tools and/or methods that have been developed and/or used.

Understanding the economic costs and benefits of climate change at the micro and sectoral level requires detailed information of specific sectors and potential vulnerabilities. While there have been numerous ad hoc reports aimed at understanding the impact of climate change on different economies, detailed data required for rigorous evaluation and understanding of the impact and optimal adaptation strategy are typically lacking. The results of this report and the policy response proposed are based on detailed farm-level information collected from this project. The reports summarize the role of agriculture in the country and provides a brief situation analysis.

Five countries conducted surveys of their own farmers for this study: Bangladesh, Indonesia, Sri Lanka, Thailand, and Vietnam. Farmers were chosen to represent the different climate zones in every country except in Indonesia where only one climate zone was sampled. Large plantations were not sampled. The farm surveys taken across each country revealed the net revenue individual farmers earned on their farms, exactly how they managed each plot, and farmer characteristics such as age, education, experience and gender. The survey also included many question about farmer awareness of the changes in their own climate and how they adapted to these changes. This data was combined with soil data from FAO (Food and Agriculture Organization, 2014) and historic climate data from the University of Delaware (NOAA, 2016). GIS was used to compute distance to nearest large city, rive, and port. The resulting data set is a rich description of South-East Asian farmers (survey is in Supplementary materials)

Key outcomes of the actions/plans undertaken:

Please provide information regarding the outcomes of the actions/plans described above, and also provide qualitative assessment and/or quantitative data to substantiate the information, if applicable

The key outcomes from this project are the country and regional reports that evaluate agricultural production in the region and offer evidence to support climate change adaptation investments in the agriculture sector. This data and analysis provides baselines for improved decision making, cost-benefit analysis, climate policy, the formulation of National Adaptation Plans and other climate actions that support achievement of Nationally Determined Contributions and the 2030 Agenda.

Description of lessons learned and good practices identified:

Please consider the following points when describing lessons learned and good practices: (a) effectiveness/impacts of the actions/plans (including measurability of the impacts), (b) efficiency in the use of resources, (c) replicability (e.g. in different locations, at different scales), (d) sustainability (i.e. meeting the current economic, social and environmental needs without compromising the ability to address future needs).

This study finds that South-East Asian farming is sensitive to climate change. Traditional

Ricardian studies at the country and regional levels reveal that net revenue is affected by seasonal climate. A structural Ricardian model of growing season choice reveals climate change will reduce net revenues in the near term by 4–8% and in the long term by 10–18%.

The implications of this impact on key sustainable development goals such as poverty reduction is likely to be profound. The study finds that farmers who rely on cultivating in three seasons will be especially hard hit by climate change relative to those that rely only on a single season. The results indicate that farmers will switch from 3 seasons to 1 season per year and reduce some of the losses that they would otherwise sustain. An analysis of crop adaptation finds that farmers will also adjust irrigation, crop choice, and the timing of planting in response to climate change. The livestock adaptation study finds that farmers will move towards livestock as climate warms. Farmers will also shift their choice of species away from large animals and move towards small animals.

An analysis of perceptions finds that farmers throughout the region are aware that temperature is rising and they generally perceive that precipitation is falling. Half of the farmers interviewed have begun to take measures such as those reported in this study to adapt to climate change. The overall results suggest that acting on their self-interest, the agriculture sector will undertake a great deal of adaptation on its own. However, measures taken by the government such as providing up-to-date weather reports, extension, irrigation and assistance with new varieties can also be effective.

Description of key challenges identified:

Please describe the key challenges associated with those actions/plans or the use of those tools/methods, that policy-makers, practitioners and other relevant stakeholders should know about.

“The empirical results indicate that many choices by farmers are climate sensitive. There is every reason to believe these choices will vary as climate changes. Using the cross-sectional estimated results, we then forecast how each farm choice would change if future climate changed. The results indicate that future crop choice could be quite different with more South-East Asian farmers choosing to grow rice and oilseeds. The number of farmers planting fruits may stay relatively constant, while other crops would consequently be chosen less frequently. Farmers would increase planting in November through March without shrinking planting the remaining months. This implies there will be more growing seasons. Farmers will also increase groundwater irrigation in these scenarios. Despite evidence that input choice is climate sensitive, there was little indication of any significant change of inputs with future climates.

“The premise of this analysis is that these changes by farmers will be motivated by profit. It will be in their own interest to make these changes as climate changes. The farmers will not necessarily need any additional assistance. However, the analysis also is clear that many other factors besides just climate affect their decisions. Tenure type and assistance from governments and other agents do affect farm choices. There are consequently many tools that can be used to encourage desirable changes in farm

choices as climate changes.

In Sri Lanka, for instance, the following key challenges and recommendations emerge from the analysis. While this is specific to the context of Sri Lanka, many high-level trends emerge that can be applied across the region.

- The level of awareness is exceptionally high, with 92 percent of the surveyed households having noticed a long-term shift in temperatures and 95 percent having noticed a shift in rainfall. This suggests that almost all households are aware that the climate is changing, that these changes are long-lasting, and that the changes go beyond expected variation in weather. Even though 92 per cent of the respondents observed a change in climate, 17 per cent of them are not taking any additional measures in their current practices.
- On the basis of assessments on the marginal impact of climate change on NR, an implication is that assistance in the form of extension services or cooperatives needs to be provided to farmers during periods of increased temperature and precipitation.
- The overall impact of climate change on net revenue is negative. By modelling irrigated versus non-irrigated farms, estimates have indicated a higher impact of temperature for irrigated farms. An increase of average temperature by 1°C would lead to a decrease of US$85.95 or (18 per cent of the total average NR) in NR per acre. Change in precipitation is not beneficial for agricultural productivity. A decrease of 1mm in precipitation during the NEM period would lead to a US$1.69 decrease in NR per acre. These results could also give an indication of the impact of climate change on poverty levels. An average farmer would lose as much as US$94.37 of revenue per acre due to climate change, whereas a medium-scale farm would lose US$148.75 of NR per acre. These results provide clear evidence that policymakers need to provide support for farmers in reducing climate variability induced hazards, particularly in the season of NEM. The Government of Sri Lanka has strategically undertaken policies aimed at providing and ensuring access to water sources. Given the climate change projections and the findings of this study, this support may need to continue.
- Policy responses such as national government extension services have been shown to be effective in increasing the likelihood of adapting to climate change (as well as the likelihood of choosing cropping as an adaptation method). Results have shown farm experience to be a major factor determining the choice of adaptation. An implication for policy makers is the necessity for strengthened information, equally distributed across the country, and improved education. Local governments need to work towards engagement in outreach and dissemination programs on measures to combat climate change. A study by Wanigasundera and Fernando (2012) has indicated that despite the widespread demand for training programmes, very few have been organized for extension officers.
- Based on climate projections, the impact of future changes in temperature and precipitation on crop farmers was analysed. Changes in future temperature and precipitation would result in vast losses of farmers' NR, with the highest estimation for irrigated farms in the 2031-2060 projections at US$183.12 per acre reduction per year (CCCMA-CANESM2 model) in comparison with US$166.07 reduction for the baseline scenario. Losses would gradually increase over time. Temperature plays a

lead role in reducing farmers' NR and accounts for US$163.83 in the 2031-2060 projections, US$238.78 in the 2051-2081 projections, and US$319.86 reductions in the 2071-2100 projections. Precipitation forecasts are positive for irrigated farms and negative for non-irrigated. Based on these findings, it is clear that there is a need for the introduction of new cultivation techniques and crops resistant to high temperatures.

- When controlling for districts, the largest impact has been estimated in the districts of Kurunegala and Anuradhapura. Based on these estimations, household farmers would experience a loss of approximately LKR6,026.98 (or about US$40.8), which would bring 26.4 per cent of the farmers into chronic poverty. Despite the encouraging progress that has been made in poverty alleviation to below 7 per cent of the population, special attention has been directed towards achieving Sustainable Development Goal (SDG) 1 (World Bank, 2016). These results suggest that if no efforts are undertaken by 2031 to combat climate change and its adverse effects, the poverty rate in Sri Lanka could rise as up to 20 per cent from the current 6.7 per cent.
- The analysis suggests that the most preferred adaptation practice was crop substitution. The types of crops to be invested in based on future variation in temperature and precipitation were studied. It is very likely that as temperature rises, farmers would focus on annual crops such as rice, cereals and vegetables and would not invest in fruits, plantation and others. As precipitation increases, farmers would invest in fruit, cereal and plantation and would move away from rice, vegetables and other crops. Finally, based on climate projections, by 2070, the likelihood of choosing rice will be decreasing. By 2030, farmers will choose cereal and other crops, whereas by 2050 and 2070, farmers will invest in rice and cereal and less in any other type of crops. While distance to market has shown not to have an impact on crop adaptation and irrigation, further research in the remote areas of Sri Lanka is needed to ensure coherency across adaptation measures.
- Given the importance of the agricultural sector for the economic and social development of Sri Lanka and based on the results from this study, efforts must be undertaken to combat climate change and its adverse effects. Based on these findings, strengthening research capacity is an important step in the development of new techniques and cultivation methods in accordance with changes in climate. The government needs to work towards the introduction of new crop varieties that will be better suited for the weather conditions, predicted from our analysis."[2]

Planned next steps (as appropriate):

Based on this experience or research, have next steps been planned to address/study some of the identified challenges, implement, scale up (e.g. from local to national context) or scale out (e.g. from one country to another) such actions/plans?

In 2017, the ECCA programme transitioned into Phase Two, in collaboration with the Asian Institute of Technology.

With an eye on long-term sustainability, the Asian Institute of Technology (AIT) took the reins in June 2017, and continue to work directly with government partners and UNDP to grow the

[2] http://adaptation-undp.org/resources/knowledge-products/economics-climate-change-adaptation-ecca-sri-lanka

region's knowledge-base regarding the costs, benefits, risk management tools, agricultural inputs and economic indicators for climate change adaptation in the region.

The ECCA Programme will continue its work in Bangladesh, Cambodia, Indonesia, Lao PDR, Maldives, Mongolia, Nepal, Philippines, Sri Lanka, Thailand and Viet Nam. While geographically diverse, among these countries are Least Developed Countries that require strengthened capacity and improved institutional effectiveness in order to reach global goals framed through global accords such as the 2030 Agenda and the Paris Agreement.

Sustainable development, economic progress, food security and disaster resilience are inextricably linked with climate change. With this in mind, it is critical that governments across the region are equipped to effectively conduct cost-benefit analysis of climate change actions to ensure that these actions are integrated in national development planning.

To support this, the programme offers regional training courses, exchange trips, and one-on-one mentoring for government officials. Key is bringing together representatives from diverse ministries, such as agriculture, finance, disaster risk and planning, as well as other stakeholders and connecting them with new ideas and new resources to build more effective plans and more effective institutions from the ground up.

"We are excited to be taking this important programme forward. AIT assists governments across Asia and the Pacific to develop their National Adaptation Plans – the ECCA programme will complement this work by providing useful tools for economic valuation and budgeting of adaptation action," said Alla Metelitsa, Head of the Climate Change Cluster at AIT. "AIT will build on the learning materials to strengthen its role in the development of a cadre of professionals who can prepare solid economic analyses related to climate change adaptation projects."

The material developed through the first phase is planned to be integrated into a regular graduate course offering at AIT. AIT also plans to open a summer school for both local and overseas students.

Meanwhile, UNDP has launched new partnerships with the Climate Policy Lab (CPL) at the Fletcher School, Tufts University, the Commonwealth Scientific and Industrial Research Organization (CSIRO); and the Centre for Environmental Economics and Policy Research in Africa (CEEPA), University of Pretoria. The goal of these new partnerships, along with the second phase of the ECCA programme, is to utilize the data that was collected through the ECCA programme in order to generate knowledge products and research papers.

An online portal hosts country-level reports by participants – examining vulnerabilities to climate change and the impacts on agriculture sectors – and the results of research gathered as part of the coursework – including questionnaires of farming households in agricultural practices. The datasets and research reports form a public knowledge resource, accessible by researchers and governments in other countries. Please visit UNDP's Adaptation Portal here.

Relevant hyperlinks:

http://adaptation-undp.org/resources/datasets/capacity-building-programme-economics-climate-change-adaptation-ecca

http://adaptation-undp.org/projects/economics-climate-change-adaptation-programme-asia-and-pacific

World Scientific Reports

SOUTH-EAST ASIAN FARMER PERCEPTIONS OF CLIMATE CHANGE

BABATUNDE O. ABIDOYE, PRADEEP KURUKULASURIYA, ROBERT MENDELSOHN

Climate Change Economics Vol. 08, No. 03, 1740006 (2017)

1740006

Abstract | References | PDF (87 KB) | PDF Plus (88 KB)

STRUCTURAL RICARDIAN ANALYSIS OF SOUTH-EAST ASIAN AGRICULTURE

BABATUNDE O. ABIDOYE, PRADEEP KURUKULASURIYA, BRIAN REED, ROBERT MENDELSOHN

Climate Change Economics Vol. 08, No. 03, 1740005 (2017)

1740005

Abstract | References | PDF (168 KB) | PDF Plus (154 KB) | Supplemental Material | Errata

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ERRATUM: STRUCTURAL RICARDIAN ANALYSIS OF SOUTH-EAST ASIAN AGRICULTURE

BABATUNDE O. ABIDOYE, PRADEEP KURUKULASURIYA, BRIAN REED, ROBERT MENDELSOHN

Climate Change Economics Online Ready

1792001

Abstract | PDF (38 KB) | PDF Plus (39 KB) | Original Article

THE ECONOMICS OF CROP ADAPTATION TO CLIMATE CHANGE IN SOUTH-EAST ASIA

BRIAN REED, ROBERT MENDELSOHN, BABATUNDE O. ABIDOYE

Climate Change Economics Vol. 08, No. 03, 1740002 (2017)

1740002

Abstract | References | PDF (381 KB) | PDF Plus (389 KB) | Supplemental Material

SOUTH-EAST ASIAN RICARDIAN STUDIES: BANGLADESH, SRI LANKA, THAILAND, AND VIETNAM

BABATUNDE O. ABIDOYE, ROBERT MENDELSOHN, SULTAN AHMED, SELIM AMANULLAH, CHANAKOD CHASIDPON, LEE BAKER, ROBERT DOBIAS, BIKRAM GHOSH, L. H. P. GUNARATNE, MUNSHI MOHAMMAD HEDEYETULLAH, ERIC MUNGATANA, CLAUDIA ORTIZ, MARIANA SIMÕES, PRADEEP KURUKULASURIYA, CHAMILA PERERA, ARUNA SOORIYAARACHCHI, ANUPIT SUPNITHADNAPORN, THUY TRUONG

Climate Change Economics Vol. 08, No. 03, 1740004 (2017)

1740004

Abstract | References | PDF (90 KB) | PDF Plus (92 KB)

Reports and Publications

Economics of Climate Change Adaptation (ECCA) Programme: Participant presentation – Philippines

Economics of Climate Change Adaptation (ECCA) Programme: Participant presentation – Nepal

Economics of Climate Change Adaptation (ECCA) Programme: Participant presentation - Cambodia

Training & Tools

Economics of Climate Change Adaptation Training, Pathum Thani, Thailand - Participant List

Economics of Climate Change Adaptation Training, Pathum Thani, Thailand - Agenda

Economics of Adaptation: Toolkit

Training of Trainers: Capacity Development on Economics of Adaptation, Water Security and Climate Resilient Development in Africa - Addis Ababa, 25-29 Nov 2013

Knowledge Products

Economics of Climate Change Adaptation (ECCA): Sri Lanka

Economics of Climate Change Adaptation (ECCA): Mongolia

Economics of Climate Change Adaptation (ECCA): Viet Nam

Highlights

Benin joins the implementation of the AU and AMCOW 's Capacity Development Programme on Economics of Adaptation Water Security, and Climate Resilient Development in Africa

Assessments and Background Documents

Background paper - Pacific Cost-Benefit Analysis Initiative (P-CBA)

Document

Hydro-Economic Model Webinar

Examples of Cost- Benefit Analysis Reports

Niue PACC Cost- Benefit Analysis Final Report

Tuvalu PACC Cost- Benefit Analysis Final Report

The Solomon Islands PACC Cost- Benefit Analysis Final Report

The Republic of Marshall Islands PACC Cost- Benefit Analysis Report

Palau PACC Cost- Benefit Analysis Report

Samoa PACC Cost- Benefit Analysis Final Report

Relevant Peer-Reviewed Articles

Marine Economics and Policy Related to Ecosystem Services: Lessons from the Mediterranean, Black and Caribbean Regional Seas (Paulo Nunes and John Gowdy, 2013)

Transdisciplinary Conceptual Modeling of a Social-Ecological System—A Case Study Application in Terceira Island, Azores (M. H. Guimaraes and J. Balle-Beganton, D. Bailly, A. Newton, T. Boski, and T. Dentinho, 2013)

An Initial Estimate of the Value of Ecosystem Services in Bhutan (I. Kubiszewski, R. Costanza, L. Dorji, P. Thoennes and K. Tshering, 2013)

What Have Economists Learned about Valuing Nature? A Review Essay (Sarah Parks and John Gowdy, 2013)

Framing Local Outcomes of Biodiversity Conservation through Ecosystem Services: A Case Study from Ranomafana, Madagascar (Susanna Kari and Kaisa Korhonen-Kurki, 2013)

Climate Models at Their Limit? (Mark Maslin and Patrick Austin, 2012)

Disaster- Prone Technologies, Environmental Risks, and Profit Maximization (Richard England, 1988)

The Impact of Climate Change on Global Tropical Cyclone Damage (R. Mendelsohn, K. Emanuel, S. Chonabayashi and L. Bakkensen, 2012)

Examining the Storm Protection Services of Mangroves of Orissa during the 1999 Cyclone (Saudamini Das, 2011)

Mangroves protected villages and reduced death toll during Indian super cyclone (Saudamini Das and Jeffrey R. Vincent, 2009)

Environmental Cost-Benefit Analysis (Giles Atkinson and Susana Mourato, 2008)

Efficient Adaptation to Climate Change (Robert Mendelsohn, 2000)

Reports and Publications of relevance to Country Teams

Potential Impacts of Climate Change on the Egyptian Economy (2012)

International Institute for Environment and Development: Cost-Benefit Analysis of Adaptation in the Water Sector (Bolivia, Bangladesh, Malawi, Morocco, and Nepal) Synthesis Report (IIED, 2013)

International Institute for Environment and Development: Cost-Benefit Analysis of Adaptation in the Water Sector (Bolivia, Bangladesh, Malawi, Morocco, and Nepal) Guidance Report (IIED, 2013)

Frequently Asked Questions: The UNDP Capacity Assessment Methodology (UNDP, 2009)

Capacity Development: Measuring Capacity (UNDP, 2010)

Capacity Development: Practice Note (UNDP, 2008)

Capacity Assessment: Practice Note (UNDP, 2008)

Capacity Development: A UNDP Primer (UNDP, 2009)

Guide to Cost-Benefit Analysis of Investment Projects (European Commission, 2008)

Handbook on Economic Analysis of Investment Operations (World Bank, 1998)

Adapting to Climate Change: Strengthening the Climate Resilience of Water Sector Infrastructure in Khulna, Bangladesh (Asian Development Bank, 2011)

Annotated Bibliography of Adaptation Studies

Further information:

Please do not hesitate to submit more detailed information on case study(ies), tool(s)/method(s) and/or other relevant knowledge resource(s) that are relevant to economic diversification. The latter will be shared through the Adaptation Knowledge Portal:

- Case study(ies)
- Tool(s)/method(s)
- Other knowledge resource(s) (online portals, policy briefs, training material, multimedia material, technical reports and scientific publications)