CTCN
CLIMATE TECHNOLOGY CENTRE & NETWORK

CTCN Technical Assistance
Response Plan

Country:	Indonesia
Request Identification Number:	2015-024/IDN-01

Title:	Hydrodynamic modelling for flood reduction and climate resilient infrastructure development pathways in Jakarta.

Project summary

Provide a brief description (maximum 200 words) of the objectives of CTCN assistance, such as services that will result from CTCN assistance (referred to as outputs) and their likely short-term effects (referred to as outcomes), an indication of the assistance duration, as well as the main in-country partners who will be directly involved in project implementation.

Please note that this summary will be used for communication and knowledge sharing purposes. It should remain brief as the details of the assistance are explained in the subsequent questions.

Jakarta is increasingly threatened by flooding from a combination of land subsidence, rising sea-levels (particularly with relation to the spring tide cycle) and higher river levels resulting from potentially increasing rainfall intensity and land use changes within the catchment areas. Strategies currently defined to address these threats include but not limited to creation of a Giant Sea Wall (GSW) to reduce the risk of flooding and coastal inundation.

The objectives of the CTCN technical assistance is to (i) better assess flood risks and hazards, and (ii) design climate-resilient pathways to reduce the magnitude and scale of the impacts from this flooding. This assessment and strategy definition will help shape the design of climate resilient infrastructure projects including, but not limited to, the GSW. The outcomes are (a) a hydrodynamic flood model that can be used to evaluate a number of hard and soft engineering interventions to reduce the risk of flooding (b) a socio-cultural survey to examine inhabitants' perceptions of flooding, levels of acceptable risks and preferred adaptation options, (c) a series of technology transfer workshops to increase local capacity in high resolution hydrodynamic modelling and use of the model, (d) resultant policy and planning recommendations to reduce flood hazards, risk and vulnerability, and (e) a roadmap to sustain and expand the project using additional funding streams.

It is considered that the likely duration of assistance would be for a maximum of 12 months. The main in-country partners for this assistance are expected to be the Jakarta Research Council, some experts from Badan Pengkajian dan Penerapan Teknologi (BPPT), Universitas Gadjah Mada (UGM), Lembaga Ilmu Pengetahuan Indonesia (LIPI), The CTCN Technical Assistance Implementation Team Leader, Universitas Indonesia (UI), Institut Teknologi Bandung (ITB), Bogor Agricultural University (IPB) and other selected parties or individuals that are identified as key contributors or recipients.

1. Overview of the assistance

1.1 Objectives (outcomes)

Briefly indicate the expected outcomes (likely short term effects) of the CTCN assistance in the country and/or sector. These outcomes should be directly attributed to the activities of CTCN technical assistance.

Through CTCN technical assistance, the major outcomes to be delivered within the lifetime of the project are designed to enhance the capacity of relevant local government agencies to address a number of flood-related issues. These short-term objectives are as follows:

a. To develop a high resolution hydrodynamic model for a pilot project area in Jakarta that is capable of producing flood levels under differing climate and/or engineering scenarios (further details are given under Activity 1A).
b. To carry out a socio-cultural survey to capture the views of the local residents within the pilot project area to the risks of flooding along with adaptation and mitigation options to alleviate these risks (further details are given under Activity 1B).
c. Through a period of technology transfer, including data transfer and training, the model is to be made available to relevant agencies in Jakarta. It is expected that this training should be in the order of four months. Specific aspects of the technology transfer will include flood modelling and hazard mapping. This will enable local agencies to further develop the model to explore a wider range of scenarios (further details are given under Activity 1C).
d. A series of recommendations aimed at local authorities to reduce flood risks. These will be obtained through expert-led workshops incorporating results from the project along with views of relevant stakeholders. These recommendations will allow local authorities to take the findings from the project into account when formulating plans to provide a sustainable future for the area (further details are given under Activity 2).
e. To initialise future funding opportunities to further expand the utilisation of the hydrodynamic model, e.g. to extend the spatial limits to incorporate all flood risk areas in and around Jakarta, or to incorporate additional components within the model (further details are given under Activity 3).

1.2 Results (outputs)

1.2.1 Outputs expected from the assistance

Briefly indicate the outputs (consisting of at least one, but preferably more than one, service and/or product) of the CTCN technical assistance in the country and/or sector. These outputs should be attributed to the activities of CTCN technical assistance.

a. Once the model development and technology transfer are sufficiently developed the model can be further utilised by experts within the relevant local agencies to run additional scenarios as and when further details become available, e.g. planning and policy directives, socio-economic conditions or climate change scenarios. This will allow for more flexibility to consider the impacts of different conditions in terms of, e.g. flood risk mapping, trend analysis and cost-benefit analysis.
b. The development and utilisation of the dedicated high resolution hydrodynamic model, allied with the results of the sociocultural study, will allow the relevant agencies and parties to gain a better understanding of the hazards, risks and vulnerabilities associated with flooding in Jakarta under different scenarios. Using this information within a series of dedicated

workshops, sustainable climate-resilient pathways can be formulated in terms of mitigation and adaptation options that align with the goals of sustainable development.

1.2.2 Expected use of Outputs

Indicate how the specific outputs produced by the response will contribute/ support/ enable the host country/request proponent to advance on implementing climate technologies once the technical assistance is completed.

Using experience and knowledge gained from integrating the modelling process and sociocultural analysis with local conditions, the results and lessons learned can be communicated to a wider audience through a series of presentations, reports, and other forms of dissemination. Depending upon different considerations, this can be done at the local (e.g. stakeholder forums), regional (e.g. ASEAN level) and global levels (e.g. COP).

1.3 Technology aspects

Briefly describe the technology(ies) supported by the technical assistance, and explain how the CTCN technical assistance will help identify, develop or deploy the specific technology(ies).
The assistance will support the development and use of a hydrodynamic model that will enable to assess flood risks under differing climate and/or engineering scenarios. The model is expected to be used by the relevant agencies of the city to understand flood risks under various scenarios, and thus support decision-making adapted to climate change effects.

In addition, the assistance will support the identification of different adaptation options, using various technologies and practices, in order to respond to these risks (hard technologies, ecosystem-based technologies, options for retreat, etc.)

2. Description of the Assistance

2.1 Activities

Describe the planned activities and sub-activities to be conducted under the assistance, as well as their corresponding deliverables. For each activity, provide of brief descriptions of actions to be conducted as well as their immediate results/usefulness to achieve the expected outputs.
Use the following format:

The activities have been assigned into three major groups, as detailed below. The first group can be considered as the initial activities that are required in order to carry out the second activity. The third activity can ensure the long-term success of this project.

Activity 1 – Flood Risk Assessment
The activities in this group are focused on determining and assessing the hazards and risks associated with flooding and coastal inundation and constitute the major part of the overall project.

Activity 1A – Model development

A flood model will be designed for a pilot project area in West Jakarta (see Figure 1 for the proposed area). The area has been chosen as one of the most flood-prone regions in Jakarta and is dominated by medium size commercial properties with additional medium-sized residential units, mainly to the north and south of the area. If considered beneficial, a decision can be made to expand the boundary to include both high-value housing and unregulated settlements, to give a broader spectrum of land use.

It is acknowledged that the accuracy, and therefore the usefulness, of the model is extremely reliant upon the quantity and quality of secondary baseline data, e.g. cross-sectional surveys, flow controls, DEM, etc. As such, it is expected that the project will be provided with suitable authority to obtain the relevant data from government agencies. Failing this, a large amount of the time will be spent on collecting primary data which will impact on the available time spent on developing and calibrating the model with respect to certain processes (see Section 2.8 on Risk Management).

The final model should simulate the following processes;

a. Coastal processes
   i. Tidal behaviour (currents and levels)
   ii. Sea-level rise
   iii. Storm surges
   iv. Wave heights
b. Fluvial processes
   i. Fluvial hydrodynamics
   ii. Rainfall-induced rises in river flow levels
c. Other processes (given time and budgetary constraints – see above)
   i. Sediment transport
   ii. Land subsidence
   iii. Land use and land use change
   iv. Engineering interventions (e.g. reclamation, flood protection)
   v. Direct waste disposal into the rivers and canals

The model is expected to operate over model run times up to the year 2100. This will then incorporate a number of likely scenarios under the umbrella of climate change, including rainfall scenarios, sea-level rise and storm events. Additional scenarios will incorporate likely urban and population growth as well as future engineering works including reclaimed land and the Great Sea Wall. It is anticipated that the model scenarios will indicate likely comparable flood risks both with and without the GSW.

Figure 1 Jakarta metropolitan area showing, in red, the proposed pilot project area.

The desired outcomes should include (a) trend analysis of flooding risks under different scenarios, (b) maps of economic, social and physical vulnerability to flooding within the pilot project area, (c) a written report outlining the key findings from the initial modelling and, (d) a one-day seminar outlining initial results, technological aspects and future role for flood modelling in Jakarta.

Activity 1B – Sociocultural Risk Assessment

A major part of the flood risk assessment consists of a survey of residents' perceptions of flooding. A local team of canvassers, possibly sourced from a local educational institution, can be assembled to develop, carry out and analyse a questionnaire-based survey along with some open-ended interviews to gauge local views on flooding. Analysis should assess how a range of factors, such as age, gender, and income, influence residents' perceptions of flood risk.

Another part of the vulnerability assessment, in conjunction with the survey, will consist of site checks to consider how exposure to flood risks varies across the pilot project area.

The analysis of residents' views and site checks should be taken into account when considering mitigation and adaptation to flooding, and where possible, be incorporated into the flood risk mapping.

Activity 1C – Technology Transfer

One other key component of the project is to ensure that technology transfer takes place so that further utilization, adaptation and expansion of the model can be done by agencies that are closely associated with flood risk assessment in Jakarta. Through a partnership between the CTCN's Technical Assistance Implementation Team Leader and selected agencies the transfer would be carried out through a number of training workshops and supervision of initial work.

As part of the technology transfer, a number of scenarios are to be explored using the hydrodynamic flood model based upon modifying (a) external drivers, e.g. climate change, sea-level rise, and (b) internal drivers, e.g. land-use change, engineering interventions. These can be assessed in relation to the levels of acceptable risk as considered by the respondents' views from the analysis of survey data.

This is expected to extend to something in the order of forty days, or eight weeks, with members of the modelling development team on hand to initialise and guide the selected local team through the

modelling software and to devise and run different scenarios. The expected number of participants in the local team will be approximately ten people drawn from relevant agencies.

Activity 1 Deliverables	Delivery date
Hydrodynamic flood model for pilot project area	Month 8
Analysis of different risk assessment (maps, report, etc.)	Month 10
Flood modelling seminar to disseminate initial results	Month 10
Analysis of socio-cultural risk assessment (report)	Month 7
Workshops/training to use flood modelling package	Months 9-12
Workshop to present results of risk assessment to relevant policy makers and stakeholders.	Month 11/12

Activity 2 – Formulate Policy Recommendations

Based upon the results from the risk and hazard assessments, through a number of workshops, recommendations will be developed to present;

a. the findings from the project and suitable mitigation and adaptation options framed as strategic climate-resilient pathways;
b. the alignment of these pathways within a regulatory framework, for example, by incorporating risk assessment within improvements to local spatial planning, and;
c. future goals for further developing the project. This can include strategic and institutional considerations (for example, upscaling of the project area and creation of a Centre of Excellence).

Activity 2 Deliverables	Delivery date
Workshops to validate initial recommendations with expert panel	Month 9
Report with recommendations on mitigation/adaptation options/technologies, alignment with a regulatory framework, strategic and institutional recommendations	Month 10
Presentation on final recommendations to relevant policy makers and stakeholders.	Month 12

Activity 3 – Developing further funding streams

This project is designed as a first step in developing the expertise and information required to create a city-wide knowledge-based system that can provide a decision-support system to allow planners and policy makers to better understand the impacts of flood interventions and to adopt more sustainable measures. Therefore, in order to maximise the potential of this project, longer-term funding is required to extend beyond the pilot-project area.

Using national experts, likely to be in the order of five people, at least two half-day meetings need to be held to, firstly, identify likely future funding streams and secondly, with the results of the CTCN-funded project to date, to make relevant proposals for further extension and/or expansion of the current project to the previously-identified funding bodies. There may be advantage in identifying the funding sources at an early stage and keeping them updated as to the progress of this project through invitations to some of the workshops and/or dedicated meetings.

Activity 3 Deliverables	Delivery date
Following a number of meetings with relevant funding bodies, written proposals to expand and extend the work of this project.	Month 10

Activity 4 – Knowledge sharing and South-South Cooperation

Drawing on the experience arising from the aforementioned activities, the CTCN and implementation partners will produce a report dealing with the lessons learned in the implementation of the hydrodynamic flood model and socio-cultural risk assessment in Jakarta. This report will contribute to the measuring and evaluating the impact of this technical assistance. This report will form the basis of subsequent publication or publications to be shared for broader impact. The geographical scope of this publication can be expanded if other experiences in the same technology area can be identified in other CTCN response plans, as well as relevant good practices used in other countries.

Additionally, the implementation team will endeavour to find South-South potentialities. The technical assistance provided in Jakarta will also be relevant to other cities undergoing similar problems. Therefore, South-South Cooperation efforts will be promoted, including for example invitations of relevant city representatives to a lesson-learned/good practice workshop or meetings.

Activity 4 Deliverables	Delivery date
A report on the lessons learned and good practice based on the findings of this response plan	Month 10
Use of this report and other material through the technical assistance contributing to preparation of publications	Month 10
South-South Cooperation meeting or workshop involving relevant other actors from other Asian countries	Month 10

2.2 Expertise required

List the expertise required to successfully implement the assistance and reach the expected objectives.

a. Modelling team for the development of the flood model. It will require a combination of approaches to simulate the conditions and requirements of the end-users
b. Risk and vulnerability analysis.
c. Socio-cultural expert: Conduction of social-cultural assessment, vulnerability assessment
d. Expertise on technology options for adaptation and resilience of coastal zones
e. Policy and regulatory expertise on coastal zones
f. Experience working with policy makers

2.3 Main partners

List and describe the role of in-country partners who will be involved in the implementation of the assistance in the country.

Partner	Role
BPPT	Recipient of final high resolution hydrodynamic model for utilization (e.g. scenario assessment) and expansion. Assessment of engineering scenarios and risk assessment.
ITB	Geotechnical knowledge with relation to land subsidence in Jakarta
JRC	Assessment of recommendations
LIPI	Support to socio-cultural survey to determine aspects of vulnerability
UGM	Appraisal of risk assessment
UI	Support in Spatial Planning
IPB	Support to Coastal Management and Social-economic aspect
MDB/IFI	Multilateral Development Banks or International Financial Institutions as possible future funding partners, to the extent possible.

2.4 Synergies

Identify past and ongoing public and private sector initiatives at the local, national or regional level that the response will specifically build on and link to.

There has already been a considerable amount of literature regarding the hydrology and flooding in Jakarta, e.g. Delinom, (2008)[1], Hay-Man Ng et al., (2012)[2]. Part of the project will be to review previous works associated with the major themes and to make use of their findings and to continue building up the body of knowledge using relevant links and sources. Additionally, there should be synergies with, for example, those involved with the GSW, as well as those involved at a more local level, e.g. flood alleviation and adaptation community projects, e.g. ADPC (2013)[3] and Peta Jakarta (2014)[4]

2.5 Timeline

Provide a timeline for the CTCN technical assistance and list specific milestones for each activity. The timeline show the roll out of the activities and sub-activities to be conducted, throughout the whole duration of the assistance

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[1] Delinom, R.M. (2008). Groundwater management issues in the Greater Jakarta area, Indonesia. *Proceedings of International Workshop on Integrated Watershed Management for Sustainable Water Use in a Humid Tropical Region, JSPS-DGHE Joint Research Project, Tsukuba, October 2007. Bull. TERC, Univ. Tsukuba, No.8 Supplement, no. 2, 2008.*

[2] Hay-Man Ng (2012). Mapping land subsidence in Jakarta, Indonesia using persistent scattering interferometry (PSI) technique with ALOS PALSAR. *International Journal of Applied Earth Observation and Geoinformation*, 18, 232-242.

[3] Asian Disaster Preparedness Center (2013) Flood preparedness initiatives of high-risk communities of Jakarta. *Retrieved from* http://www.adpc.net/igo/category/ID226/doc/2013-c28Jbn-ADPC-Safer_Cities_27.pdf *on 29 September 2015.*

[4] Peta Jakarta (2014). Assessing the role of social media for civic co-management during monsoon flooding in Jakarta, Indonesia. *Retrieved from* http://petajakarta.org/banjir/en/ *on 29 September 2015*

Activity	Month											
1 Flood Risk Assessment	1	2	3	4	5	6	7	8	9	10	11	12
1A Model development												
Conceptual model development												
Data collection and formatting												
Model development												
Model calibration												
Scenario testing												
Flood modelling seminar												
1B Socio-cultural risk assessment												
Survey design												
Survey activity												
Survey analysis and report												
1C Technology transfer												
Technology transfer												
2 Policy recommendations												
Develop recommendations												
Policy workshops												
3 Future funding												
Draw up funding strategy												
Funding workshop												
4. Knowledge sharing and South-South Cooperation												
Partnership development												
Report writing												

2.6 Indicative budget

Provide an indication on the maximum amount of resources required to implement the assistance.
The budget is anticipated to be in the range of USD 230,000 to USD 240,000. Please see Annex 2 for an indicative breakdown of the budget.

2.7 Gender considerations

Explain how gender considerations are included within the proposed activities, and also indicate any gender co-benefits that will be gained as a result of implementing this Response Plan.
The sociocultural survey is to be designed to take into account gender-specific and family-related issues with respect to flood risk and vulnerability. Impacts on family life, female employment, education, post-traumatic stress and other gender considerations from flooding will be explored. Outcomes can include identifying at-risk groups and recommendations to improve gender-sensitive emergency planning. These findings are to be incorporated within the policy and planning recommendations, especially with respect to residential areas that are vulnerable to flooding.

2.8 Risk identification and risk mitigation

Identify risks that could jeopardize the realization of project outcomes and expected impacts, their probability and how the assistance will mitigate these perceived risks.

Risks	Consequence	Probability	Mitigation
Inaccurate or inadequate secondary data for modelling (e.g. DEM and land use)	Modelling results not suitable for the purpose of accurate risk assessment.	20-30%	Address the issue of accuracy as increased uncertainty in the results.
Cost overruns	Incomplete set of modelling results and/or limited recommendations	5-10%	Through liaison with NDE/CTCN, modify outputs/outcomes.

2.9 Monitoring and Reporting

Provide information on how the monitoring and reporting for the project will be constituted.
Progress reporting can be carried out on a quarterly basis through a written report submitted to CTCN and the NDE. This is in addition to monthly half-day meetings to maintain strong communications between the NDE and the working parties.

3. Long-term impacts of the assistance

3.1 Expected climate benefits

Describe the long-term results (impacts) produced by CTCN assistance, including its contribution in mitigating and adapting to climate change. If possible, insert specific targets.

The major benefit will be, through the use of the modelling and survey results, to provide local agencies the ability to develop alternative pathways to reduce the risks of flooding and its associated damage resulting from a combination of the likely impacts of climate change and land subsidence. It can provide the first step of a roadmap to provide better city-wide urban resilience by demonstrating likely effects from sequences of interventions, from either hard engineering (e.g. dams and gates) and/or ecosystem-based flood mitigation, (e.g. enhanced floodplain storage and flow reduction strategies). These climate-resilient pathways will allow for future sustainable growth in the region through long-term optimisation planning to reduce the risk of flooding.

	Climate Benefit	Expected contribution from CTCN assistance
1	Climate technologies adapted to national context are identified and prioritized to enable their deployment and/or transfer in the requesting countries	The hydrodynamic model is developed to work within the specific context of Jakarta. This will be transferred to work within and for the government of Jakarta.
2	New national Technology Needs Assessment (TNA) and Technology Action Plan (TAP) as a result of the response	A TNA/TAP can be part of the recommendations to improve the modelling capacity (human resources) and/or accuracy (technical resources).
3	Progress made against mitigation objectives	

	(i.e. energy and carbon intensity reduction) as a result of the response	
4	Progress made against adaptation or resilience objectives (e.g. climate vulnerability index improvement) as a result of the response	This project will produce options/pathways to reduce the impacts of flooding and provide a roadmap to improved climate resilience.
5	New mitigation or adaptation technology projects/initiatives implemented as a result of the response	The results will identify focal areas for new adaptation initiatives, e.g. technical, structural or community, and provide recommendations and/or guidelines to achieve the objectives.
6	New or strengthened policies/ laws developed, approved and enacted as a result of the response	The role of recommendations is to enhance the regulatory framework within which flood mitigation and adaptation initiatives and planning can operate.
7	New policies/laws where climate change was mainstreamed as a result of the response	Local bye-laws and regulations can be designed to adopt specific measures that accommodate the impacts of climate change, i.e. flood adaptation and flood response.
8	Country integrating climate change mitigation and/or adaptation issues into its planning and policies as a result of the response	It is anticipated that at the city-level the government will adopt the findings from this work to better manage flood response and planning authorities will use the results to better adapt to future flood risks.
9	New or strengthened Public-Private Partnerships (PPP) created directly as a result of the response	There is likely to be an enhanced partnership between the technology recipient (public) and the technology provider (private). Further development of the technology will likely strengthen this partnership.
10	New or strengthened twinning arrangement created as a result of the response	The response is looking to develop partnerships as a South-South Cooperation within the Asia-Pacific and South Asia.
11	Capacities to access and attract public and private finance increase to enable financing of technology deployment	Activity 3 specifically looks to identify future funding partners to enhance the technology and to broaden its use to other locations.
12	Post-response intervention funding attributable to the response.	
13	Framework and analysis of local production developed to enable deployment of national production of climate technologies	The technology transfer can allow the development of an urban flooding Centre of Excellence to disseminate the methods and techniques on to a national and international scale.

3.2 Co-benefits

Describe the anticipated economic, social, and environmental co-benefits of the assistance, including contribution to achieving the Sustainable Development Goals.

The aim of the project is to provide relevant tools and expertise to support decision-makers in formulating policy and action plans to reduce flood risks in Jakarta. As part of this, the project also aims to enhance the technical capacity of relevant agencies in order to better support sustainable city planning. In doing so, the project also aims to contribute to the long-term viability and sustainability of the affected urban areas. In economic terms, flood alleviation will allow a more resilient economy to develop without the risks associated with flood damage. In social terms, as the threat of flooding recedes it will also produce scope for greater economic development and also produce stronger social cohesion as communities remain *in situ* rather than undergo rehousing or suffer from further flood damage. Additionally the project addresses some of the UN Sustainable Development Goals as outlined below.

No.	Sustainable Development Goal	Contribution from project
1	End poverty in all its forms everywhere	Reduction in loss of property and possessions through flooding
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture	Through the protection of urban arable land from flooding
3	Ensure healthy lives and promote well-being for all at all ages	Reduce occurrence of flood-related disease outbreaks
4	Ensure inclusive and equitable quality education and promote life-long learning opportunities for all	
5	Achieve gender equality and empower all women and girls	
6	Ensure availability and sustainable management of water and sanitation for all	Better management of water resources
7	Ensure access to affordable, reliable, sustainable, and modern energy for all	
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	Capacity building creates more water professionals and CIT experts
9	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	Contributes to government "flood operation and management" activities in future developments. Reduction in flood damage will enhance resilience of infrastructure
10	Reduce inequality within and among countries	Alleviation of flood damage will be of greater benefit to the poor.
11	Make cities and human settlements inclusive, safe, resilient and sustainable	Better flood protection will produce safer, more resilient and sustainable cities
12	Ensure sustainable consumption and production patterns	
13	Take urgent action to combat climate change and its impacts	Early planning for flood prevention is needed to ensure correct adaptation and mitigation measures are taken

14	Conserve and sustainably use the oceans, seas and marine resources for sustainable development	The marine models developed from this study can be used or upgraded for future usage in case of reclamation works, EIA studies, etc.
15	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	Use of ecosystem-based technologies and restoration of terrestrial/coastal ecosystems to increase resilience of city and communities
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	
17	Strengthen the means of implementation and revitalize the global partnership for sustainable development	Contributes to the strengthening of South-South synergies in building resilience to flooding in the region

3.3. Post-assistance plans and actions

If possible, provide indications on specific actions and plans that the country can implement in order to maximize the use of the outputs produced by this technical assistance in achieving the expected climate benefits described above.

If utilised correctly, further results from the model can be used to inform relevant policy makers and planners to build resilience into their strategies well into the future. However, this requires long-term support for the modelling process, in terms of data collection and management, maintaining hardware and software capabilities and also maintaining the expertise needed to successfully continue with this endeavour.

As previously mentioned, (see Activity 2, paragraph c) with appropriate governmental support, this could be achieved by the inception of some form of agency or institution tasked with the continuation of this project. This agency would act as a focal point or knowledge base for all requirements related to hydrodynamic modelling and flood alleviation.

Once the capacity building is suitably mature, the flexibility of the system should allow the process to be adapted to other cities, either on the national scale, e.g. Palembang, Semarang and Surabaya or at the international scale where a number of cities are undergoing similar problems, e.g. Ho Chi Minh City, Mumbai and Guangzhou. On the basis of the basis of the South-South Cooperation meetings or workshop (see Activity 4), potential synergies and technology transfer could take place in the region.

4. Formal agreement and signatures

Signatures of the requesting country

For the NDE
Name: Dr. Nur Masripatin
Title: Director General of Climate Change,
Ministry of Environmental and Forestry
Date: 27.11.2015

Signature:

Date:

Signature:

Signatures of the CTCN

For the CTCN Director
Name: Jukka Uosukainen
Title: CTCN Director
Date: 27.11.2015

Signature:

Annex 1: Logframe

Activity	Description of sub-activities conducted by the CTCN	Output and deliverables	Main national partners involved	Objectively Verifiable Indicator
Activity 1: Flood risk assessment	Model development	Fully-operable hydro-dynamic flood model for pilot project area	Relevant data holders and stakeholders	Model demonstration
	Socio-cultural risk assessment	Report and workshop to demonstrate residents' views on flood hazards and vulnerability	Institute of higher education	Report and workshop to present findings
	Technology transfer of flood model	Transfer flood model and expertise to local host agency	BPPT	Running of scenarios by local agency
Activity 2: Formulation of policy recommendations	Development of recommendations emanating from Activity 1 to relevant authorities.	Report and workshops to present findings	National Team	Consideration of recommendations by relevant authorities
Activity 3: Developing future funding streams	Presentation to financial decision-makers for further project development	Workshop	National Team	
Activity 4: Knowledge sharing and South-South Cooperation	Development of a publication on Good practice and lessons learned drawn on this CTCN technical assistance experience	Publication		Knowledge sharing leading to new projects in the region
	Presentation of lessons-learned to other relevant actors in the region.	Workshop		

Annex 2: Budget

The budget template is based on the format required for legal agreements with the CTCN
It should be copied in excel and inserted in Annex 2 when finalized.

Below is an estimated budget the designated tasks.

Activities	Estimated Total Cost (USD)
Activity 1: Flood risk assessment	**179,000.00**
Activity 2: Formulations of policy recommendation	**40,800.00**
Activity 3:Developing future funding streams	**6,300.00**
Activity 4:Knowledge sharing and South-south cooperation	**13,900.00**
TOTAL	**240,000.00**

Out of the total estimated budget of USD 240,000, 30 % will be allocated to the National Partners (JRC as the Proponent for this request and other relevant national or sub-national actors)

Implementation of this Response Plan will be led by the Climate Technology Centre (including selection, contracting, supervision and monitoring of implementation partners) in close coordination with Indonesia's National Designated Entity to the CTCN, JRC as the Proponent for this Request to CTCN, and other relevant national or sub-national actors. Implementation will be carried out by an international Consortium or Network Partner of CTCN. Local expertise and consumables may be contracted or subcontracted to national actors for relevant activities.

Annex 3: Terms of Reference for assistance provider *(in case of tendering process, and in line with UNOPS template/requirements TBD)*

KEMENTERIAN LINGKUNGAN HIDUP DAN KEHUTANAN
DIREKTORAT JENDERAL PENGENDALIAN PERUBAHAN IKLIM
Alamat : Gedung Manggala Wanabakti, Jalan Gatot Subroto, Jakarta 10270 Kotak Pos 6505
Telpon : 021-5720144 Fax : 021- 5720194

Our ref: S. 295 / MS2R /2015
Attachment: 1 (one) document
Subject: Approval of CTCN TA Response Plan "Hydrodynamic Modelling for Flood Reduction and Climate Resilient Infrastructure Development Pathways in Jakarta", Indonesia

To:
Mr. JukkaUosukainen
Director, Climate Change Technology Center and Network (CTCN)
UN City, Marmorvej 51
2100 Copenhagen, Denmark

Jakarta, November, 2015

Dear Mr. Uosukainen,

In response to the e-mail from Mr. Jason Spensley, Climate Technology Manager of CTCN dated October 1, 2015 concerning the request of Technical Assistance from Indonesia, we would like to inform you that we have evaluated one of the Response Plan which had been advanced, entitled "Hydrodynamic Modelling for Flood Reduction and Climate Resilient Infrastructure Development Pathways in Indonesia". We have met with the proponent and technical experts. They have made presentations of their plans, and we are in the opinion that the plans are well designed and that we are optimistic that the model could later be put into implementation and even replicated in other locations in the coastal areas of Jakarta.

We found the model appropriate and I have signed the Response Plan as my approval of the proposed activities. We kindly request CTCN to proceed with the required arrangement for further implementation of the study.

Thank you for your cooperation.

Yours sincerely,

Dr. NurMasripatin
Director General of Climate Change
Ministry of Environment and Forestry