| 1. Project information | |
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| **Project title** | Using Drones and Early Warning Systems for Pre- and Post-Floods Disaster Management in the Gambia |
| **Government of The Gambia:** | **Sanna DAHABA,**<br>Executive Director,<br>National Disaster Management Agency (NDMA),<br>Email: Sannabairo@gmail.com, Tel +220- 7780731<br><br>Project focal point:<br>**Kawsu BARROW,**<br>Monitoring & Evaluation Officer,<br>National Disaster Management Agency (NDMA),<br>Email: kawsu2010@yahoo.com, Tel +220-314 1037 |
| **UNESCO Contacts:** | **Dmitri SANGA**<br>Regional Director<br>UNESCO Regional Office for West Africa (Sahel)<br>Tel : + 221 33 864 96 00<br>Fax : +221 33 820 23 42<br>Route de la plage de Ngor, Almadies<br>BP 3311 Dakar, Senegal<br><br>**Anthony MADUEKWE**<br>Programme Specialist - Natural Sciences<br>UNESCO Regional Office for West Africa (Sahel)<br>Tel : + 221 33 864 96 22<br>Cell : +221 77 666 3586<br>Route de la plage de Ngor, Almadies<br>BP 3311 Dakar, Sénégal |
| | **Ali Mohamed SINANE**<br>Programme Specialist<br>Section for Mobilizing Resources<br>from Multilateral and Private Partners<br>Bureau of Strategic Planning<br>Tel: +33 1 4568 1247<br>7, Place de Fontenoy, Paris, France |
| **Geographical scope/ benefitting country(ies):** | The Gambia |
| **Duration in months:** | 24 |

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| **Total funding requested in US$** | **1,165,048** USD |
| **Development Partner** | India-UN Development Partnership Fund |

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| **Hon Mamadou TANGARA**<br>Minister of Foreign Affairs, International Cooperation and Gambians Abroad | **Jean-Yves LE SAUX**<br>Director, Bureau of Strategic Planning, UNESCO | **Ms. Seraphine WAKANA**<br>United Nations Resident Coordinator, UNDP Resident Representative, The Gambia |

| 2. Project description (including rational, background and implementation strategy) | |
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| **Rational and background** | |
| **2.1 Summary Description** | |
| **2.2 Sustainable Development Goals** | This project has direct impact on the following Sustainable Development Goals (SDG) targets:<br>11.5 (significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations DRR) and<br>13.1 (Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries Climate-related disasters)<br>13.3 (Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning)<br>It will overall have impact to and contribute to the Paris agreement on climate change and the Sendai Framework on disaster risk reduction.<br><br>It will have additional impact on others SDGs including 1.5, 3.3, 5.5, 6.a, 6.b, 9.5, 9.b, 11.5, 11.b, 12.a, 13.b, 15.3, 17.18 and 17.19.<br><br>It is directly contributing to the implementation of Main Line of Action No. 3 for Natural Sciences in UNESCO's 39 C/5: improving knowledge and strengthened capacity at all levels to achieve water security.<br><br>UNESCO is working with Member States to implement the 2030 Development Agenda in an integrated manner across all its areas of competence (education, natural sciences, social and human sciences, culture, communication and information), capitalizing on its multidisciplinary expertise and inter-sectoral mandate.<br><br>In addition, this project is expected to fill the region gap in flood management capacity and to contribute to the 2015 - 2030 flood management agenda of the Economic Community of West African States (ECOWAS).<br><br>This project is also contributing and in line with the African Union 2063 Agenda, mainly in the context of climate change mitigation and sustainable use and management of water resources in its Aspiration 1: A prosperous Africa based on inclusive growth and sustainable development.<br><br>Furthermore, the project will address the Seven Global Targets of the SENDAI Framework Disaster Risk Reduction 2015 – 2030. |
| **2.3 Overall purpose and relevance (including needs, issues and baselines)** | The Gambia is located within the drainage basin of the Gambia River and consists of five ecoregions. Due to its location, the country is susceptible to hazards such as riverine flooding, flash floods, deforestation, windstorms, and other challenges. The Inter-governmental Panel on Climate Change (IPCC) lists the country among the 100 critical countries most vulnerable to climate change and particularly susceptible to weather-related hazards. Agriculture is the main source of livelihood for a majority in the Gambia and the constant floods affect the livelihoods of more than 70% of the population at any time the incidence occurs. People generally live in unsuitable areas exposed to flooding or in proximity to hazardous environments that further increase their vulnerability. From 2010 to date, most parts of the country have experienced extensive flash floods with little or no resilient capacities to cope. These have severe consequences on education, community lives, and livelihoods. In 2010 for instance, flash floods affected 35,000 persons with 2,673 |

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| | families directly impacted and 35 deaths representing a very high figure considering the Gambia's population. In 2015, 5,757 persons were affected, in 2016, 15,190 persons and in 2017 over 28, 472 were affected and currently, in 2018 the number is more than 41,324 people affected by hazards, flooding being the most common hazard. The UN has projected in the UN Country Team Harmonized Framework of Support to The Gambia for Disasters in 2018 than 43,000 persons will require direct lifeline support in 2018 and 350,000 people shall be affected by hazards that include loss of productivity and food insecurity. The current standard response is a post-catastrophe crisis management, because the Gambia lacks adequate forecasting and alert capabilities, made worse by lack of human capabilities for pre-flood monitoring and post-flood rapid assessment of damages to lives, properties and livelihoods.<br><br>The use of drones (Unmanned Aerial Vehicles, or UAVs) for pre- and post-disaster assessment will help managers and technicians undertake long-term climate risk assessments, mapping of safe sites, unsafe areas and evacuation routes. Furthermore, they would help in the rapid identification of damage to the physical environment and at-risk individuals in post-disaster situations. A common flood planning challenge is that, in a crisis, authorities often find themselves working with topographic data that is out-of-date. This can lead to inaccurate models and wrong decisions—which can cost lives. However, more regular mapping of flood-prone areas is now both practical and affordable, thanks to advances in physical automation. Drones make it easy for anyone to capture survey-grade topographical data over large areas quickly, for flood planning and other emergency response procedures.<br><br>The strengthening of the rudimentary Early Warning Systems in the Lower and Upper regions of the Gambia and the Banjul Region especially its coastal area would contribute to providing appropriate information with the expectation that flood risk management would be enhanced. This strengthening of the end-to-end Early Warning System entails both providing and installing all necessary equipment (automatic weather stations, water level recorders, gauge plates, rain gauges, telemetry, communication equipment, etc.) and training officials on usage, maintenance, and early warning operations and procedures. Combining this with the planned platform for the Data Integration and Analysis System (DIAS) for the Gambian Basin, the agencies responsible for disaster management in the Gambia can obtain long-term forecasts and use integrate them into their planning. |
| **2.4 Impact** | The overall objective of the project is to contribute to poverty alleviation by reducing flood risk and vulnerabilities and increasing flood disaster resilience of the populations. The specific project objectives:<br>• To develop the capacity and readiness of the Gambia in deploying drones for disaster and climate risk assessments, as well as for rapid identification of damage to the physical environment and of endangered individuals in post-disaster situations;<br>• To strengthen the early warning system for floods across the Gambia, including data collection, integration, analysis and communication of alerts or requests for action.<br>• To support affected communities in building a people-centred early warning system<br><br>The use of drones (Unmanned Aerial Vehicles, or UAVs) for pre- and post-disaster assessment will help managers and technicians undertake long-term climate risk assessments, mapping of safe sites, unsafe areas and evacuation routes. Furthermore, they would help in the rapid identification of damage to the physical environment and at risk individuals in post-disaster situations.<br><br>The strengthening of the rudimentary Early Warning Systems in the Lower and Upper regions of the Gambia and the Banjul Region especially its coastal area would contribute to provide appropriate information with the expectation that flood risk management would |

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| | be enhanced. This strengthening of the end-to-end Early Warning System entails both providing and installing all necessary equipment (automatic weather stations, water level recorders, gauge plates, rain gauges, telemetry, communication equipment, etc.) and training officials on usage, maintenance and early warning operations and procedures. Furthermore, working in synergy with AGRHYMET a Gambian flood early warning system on the Data Integration and Analysis System (DIAS) will be set up to support the linking of the Gambian Basin management on the common regional platform for flood management in West Africa.<br><br>The strengthening of the management and decision-making capabilities of officers responsible for disaster risk reduction at the local, regional and national levels would results on increased ability to forecast and reduce the impacts of floods. The result of targeted community activities would lead to increase awareness and adoption of proactive approaches towards flood risk management and the strengthening of community participation and responsiveness to early warnings for disaster risk reduction.<br><br>The long-term impact of the project would be (1) strengthening of management and technical capacities to manage flood risk disasters in the Gambia, (2) support communities to build effective skills and completely awareness of their roles in flood-risk disaster management through education, communication and other advocacy methods. |

| **Approach** | |
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| **2.5 Implementation strategy and Theory of change** | The project will address the current ineffective and rudimentary hazards, flood early warning system, and human capacities in the Gambia through various activities and outputs leading to enhance flood risk management in the country.<br><br>The project will seek to capitalize on synergies with another UNESCO project, the West Africa Flood Project that seeks to enhance the capacity of countries and river basin organizations on the management of flood disasters through integrated flood management approaches. That project supports Benin, Burkina, Cameroon, Chad, Cote d'Ivoire, Ghana, Guinea, Mali, Niger, Nigeria and Togo but not The Gambia. Hence, the relevance and necessity of this project and the advantages of linking the Gambia to region wide risk monitoring and response systems. |

To respond to the needs that have been identified, the project will have the following outcome, outputs and activities:

**Outcome:** The Gambia contributes to best practices in disaster risk reduction management and the SENDAI Framework Agenda

**Outputs of the project:**

- Drones used in pre- and post-disaster assessment, climate risk assessments and rapid identification of damages and at risk individuals
- End-to-end flood warning system in place.
- People-centred early warning system functions.

**Activities of the project:**

**Activity 1: Inception workshop**

A Project inception workshop to building ownership and support of all stakeholders and enhance the understanding of project and participation in early warning and disaster response activities. A workshop that will have about 50 to 70 persons in attendance to be held in Banjul, the Gambia and would involve invited experts from national water and environmental agencies, AGHRYMET, the ECOWAS Secretariat and hydro-meteorological services experts from the River Gambia and Senegal River Basin Authorities. We would invite community leaders, leaders of the educational sector, from agriculture, commerce and other sectors gravely affected by flood disasters along with heads of women associations in communities mostly affected by floods in the Gambia. Others would include the Resident Coordinator's Office in the Gambia, the representatives from the Honorary Consulate in Gambia or Indian Embassy in Senegal WMO, FAO and other UN agencies involved in flood disaster management in the Gambia. Experts from UNESCO headquarters and in the field offices would also participate in the workshop.

**Output 1: Drones used in pre- and post-disaster assessment, climate risk assessments and rapid identification of damages and at risk individuals.**

**Activity 2: Procurement, training and deploy of drones for pre- and post-disaster situational mapping and analyses.**

Following the inception workshop UNESCO would through an open bidding system procure drones, photogrammetry equipment and software. Following the purchase of the drone and photogrammetry equipment, UNESCO would organize extensive training sessions for fifteen (15) technical staff of the NDMA and collaborating national agencies on flying of drones and on the analyses of images including the use of digital elevation models and 3D Imagery for studying landscapes. We shall try to obtain drone certification for the trainees from recognized bodies and ensure they follow all rules and regulations of the Gambia for their use. Immediately after the training sessions, the trainees will work with hired consultants to conduct field-testing of the drones to evaluate the data outputs and design the mapping approaches to be used for pre- and post-disaster mapping. Furthermore, documentation of best practices from the drone tests and preparation of a roadmap to guide the implementation of surveys would be undertaken by the hired experts.

**Output 2: End-to-end flood warning system in place.**

**Activity 3: Set up an end-to-end flood warning system**

To embark on the development of an early warning system platform in the Gambia, the project team shall use the procurement procedures of UNESCO to purchase to following equipment for the project pilot sites:

Procurement of early warning system equipment, installation, testing and training

The equipment to be purchased would be guided by the regional harmonization for flood early warning system that the ECOWAS is developing with the AGRHYMET.

Procurement would be followed by installation and testing of equipment after which training of the operational staff on the use and maintenance of the systems would follow.

In collaboration with the AGRHYMET two Gambian experts will participate in a regional training of trainers workshop on the Flood Early Warning system (FEW) that would be organized at Niamey in Niger. Furthermore, after this training the two experts (one hydrologist and one hydro-meteorologist or equivalent) would remain in Niger for four more weeks with AGRHYMET experts to work to set up the Gambian flood early warning system on the Data Integration and Analysis System (DIAS).

National training workshops will hold in three regions (Lower River, Upper River and Banjul Region) on flood risk management, flood mapping, and contingency planning for a minimum of 150 people. The composition of participants will include regional DRR Heads, Regional Technical Officers, and community leaders including women leaders, leaders of the agriculture and commerce sectors, and Heads of School Management Boards in the regions.

A third training course would be organised on evidence-informed decision-making to strengthen the use of evidence coming from the data obtained from both the drone systems and the EWS for informed decision-making to strengthen flood risk management. This will be a single training targeting senior management level officers in DRR-related Ministries and agencies in the Gambia.

**Output 3: People-centred early warning system functioning**

**Activity 4: Engage local officials and community participation in the management of disaster risk reduction.**

The NDMA with the support of the AGRHYMET will lead capacity-building activities for local officials with responsibilities in the early warning system, and of Disaster Management Committees. Community outreach and awareness workshops on the early warning systems, conducted at schools and community centres. For each selected vulnerable community, various meetings with administrative entities, community and their leaders would be organized in order to sensitize the community and to have their buy in for the setting up of the early warning systems. A contingency plan would be prepared and discussed with the community. About 10,000 people would be reached with the planned advocacy and educational activities to be organized during the project duration.

**Activity 5: Vulnerability mapping by communities and schools**

The NDMA will lead in community training workshops on vulnerability mapping activities throughout the selected regions. At least 50 primary and secondary schools and 5,000 schoolchildren to would participate in these activities to enhance their disaster preparedness. Vulnerability maps would be prepared by the communities and the NDMA to help in the identification and mapping of the most vulnerable sites and households and identify the evacuation routes and safe (raised) locations to be used at the time of floods. As part of strengthening resilience, the hazard mapping from regular exercises would be for sent via a mobile application to be developed by youths in the regions to the national DRR system. Young programmers in the Gambia would develop the mobile application through a competition that the NDMA and UNESCO would organize through UNESCO's YouthMobile Platform. We have proposed a first prize of US$ 2,000, a second price of US$ 1,000 and a third prize of US$ 500 to attract a large participation in the competition and to serve as a way of boosting IT innovation and enterprise as a spin-off from this competition in the country. We anticipate a minimum of 100 youths to be

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| | engaged in this activity.<br><br>**Activity 6: Strengthening of community-level Disaster Management Committees and task forces for communication of early warnings and responses.**<br><br>Building on materials that will be developed by the ICHARM West African Flood Project managed by UNESCO, suitable education materials including water flood disaster management and domestic mitigation and preparedness measures will be produced for the Gambia. In addition to the training module on the contingency planning for communities developed during the stay of the four experts at ICHARM, additional education and awareness raising materials would be prepared. AGRHYMET centre will provide support in adapting relevant education materials in collaboration with the NDMA. Ten thousand people are to be reached in the selected communities reached using the materials developed in this activity.<br><br>**Activity 7 : The Gambian Education system supported and strategies for DRR in schools improved.**<br>The main focus of the activity would be on:<br>- Child-Centred DRR and Comprehensive School Safety: development of a template for the Gambia<br>- Strategies for disaster risk reduction education: Review and development of recommendations<br>- DRR in Curriculum review exercises<br><br>Fifty senior and middle level Education Officer at the national and regional levels will participate in workshops aimed to improving the educational readiness and response to flood disasters in the Gambia.<br><br>**Activity 8: wide dissemination of education messages through community radios**<br>Media training and support in developing flood related programmes for community radios to help strengthen awareness and preparedness of the media to be conducted by the Communications Sector of UNESCO.at least 50 journalists would be reached and between five and ten community radios affected. |
| **2.6 Project timeline** | The project is expected to start in April 2019 with an inception workshop in Banjul. The timeline of the project is as follow.<br><br>**May 2019**<br>- Signing of agreement with the Vice President's Office, the NDMA and UNESCO on the project.<br>- Inception workshop with all national stakeholders and invited international experts<br>- Technical meetings with the Project Management Team and agencies involved in flood risk management for sharing the regional characteristics of flood risk, the current system issues to be improved and the data availability and making detail designs of system upgrading and capacity building within the country.<br>- First awareness raising assemblies in the main recipient communities where the equipment for EWS would be installed.<br>- Preparation of an Inception Report by the PMT.<br><br>PHASE I:<br>**June 2019 – December 2019**<br>- Procurement of drones and photogrammetric equipment and software.<br>- Drone flying training for selected trainees.<br>- Short course on Geographical Information System (GIS), geospatial and hydrological models. |

- Short course on Unmanned Aerial Vehicles UAVs for Environmental Monitoring
- Short course on Using UAVs to improve Flood Risk Management.
- Short course on spatial analyses, digital elevation models and 3-D photogrammetric reconstruction.
- Conduct field-testing of the drones to evaluate the data outputs and design the mapping approaches to be used for pre- and post-disaster mapping.
- Documentation of best practices from the drone tests and preparation of a roadmap to guide the implementation of surveys.
- Preliminary mappings of selected flood zones and creation of pre-disaster datasets for selected areas. Note during the period of this project, the equipment will be used in real-time if flooding occurs to determine its usefulness and improvements to be made on it accuracy.

**August 2019 - to January 2020**

The equipment to be purchased would be guided by the regional harmonization for flood early warning systems that the AGRHYMET is developing for the ECOWAS.

- Procurement of early warning system equipment.
- Installation and testing of equipment at the selected sites
- Training of staff to manage and operate the equipment. The NDMA and Meteorological Services Department will select staff to be trained to manage and operate the equipment from the regional/Local Government Offices of the Gambian disaster management team.
- Training course in Banjul on evidence and informed decision making for mid- and senior level planners in environment and disaster-related agencies.

**September to October 2019**

- Selected Gambian technicians will participate in the training of trainers to be organized by AGRHYMET for national experts in Niamey Niger Republic.
- Two Gambians (Hydrologists and hydro-meteorologists, participate in the development of the Data Integration Analysis System (DIAS) to be developed for the Gambian Basin as part of the Flood Early Warning System for West Africa in Niamey Niger Republic.

**November 2019 to April 2020**

- The NDMA organizes using the trained trainers a series of national and regional training workshops for at least 150 persons on flood risk management, flood mapping and contingency planning.
- The Gambia will organize and invite the AGRHYMET to help evaluate the EWS after the deployment. A workshop would follow to review the prototype performance and possible corrections or strategies for linking with the regional platform for flood risk management.
- One Workshop on Child-Centred DRR and Comprehensive School Safety: development of a template for the Gambia
- One Workshop Strategies for disaster risk reduction education: Review and development of recommendations
- Two DRR in Curriculum review exercises

**June 2020 - April 2021**

- Monthly flood mapping exercise with drones for mastery and strengthening of capacities and for planning and emergency procedures;
- Evaluation of data set and results of analyses by eternal consultants for corrections and improved interpretation of results.
- Advanced training on Digital Elevation models in watershed management as flood zonation mapping with drones and satellite imageries

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| | **August 2019 – April 2021 (Community-based activities)**<br><br>- Capacity building for schools and communities on hazard mapping.<br>- Local development of mobile apps for hazard identification and sharing on local boards.<br>- Support three community/schools quarterly exercises on hazard mapping and documentation of results for improved community training programmes.<br>- Prepare and produce suitable education materials including flood disaster management and domestic mitigation and preparedness measures. The project team will utilize and contextualize the educational materials developed by AGRHYMET for this purpose.<br>- Local communities trained on flood risk management combined with the response The main focus areas for the community education and awareness raising would be the three selected pilot areas (Lower River, Upper River and Banjul area) for the community early warning.<br>- Various education/sensitization sessions would be organized for local communities. In the regions, the local representatives of the national disaster-risk reduction platforms would be mobilized and involved in the education and sensitization activities.<br>- Wide dissemination of education messages through community radios. Programmes for community radios would be prepared based on the education and awareness raising materials and aired within the selected communities and beyond.<br>- The activities would be implemented in collaboration with Education, Communication and information and Social and Human Science sectors.<br>- Policy briefs and Reports obtained from work on this project shall be prepared by national experts and disseminated online and in hardcopies.<br><br>**April – May 2021:**<br>– Final Project Evaluation<br>– Evaluation Workshop in Banjul<br>– Project Final Report and Financials |
| **2.7 Stakeholders : Beneficiaries and partners** | The direct beneficiaries of the project are officials of the Disaster Management Agency at the National, Regional and Local levels, the Gambia Hydrological Services and relevant national institutions. The ultimate beneficiaries are members of the productive local communities (farmers, pastoralists, business people) affected by floods on a yearly basis, schoolchildren and the communities where the early warning systems will be established.<br><br>The project ownership and sustainability will be assured by the involvement of the National Disaster Management Agency (NDMA) from the project proposal stage, the Vice President's Office, and the various regional and local chapters of the Disaster management Agency. The communities where the community flood early system will be established will also be involved at early stage to ensure acceptance and involvement in the implementation. Finally in each country, the disasters management agency and relevant other institutions will be involved in the design and implementation. |
| **2.8 Risk analysis and mitigation** | Risk analyses carried out shows that the five main risks areas are:<br><br>- Misunderstanding of the objectives of the project by key stakeholders<br>- Inability to find suitably qualified candidates to the competences to run the drones and carry out photogrammetric analyses<br>- Cultural barriers to full community participation:<br>- Confusion in ownership of the project<br><br>**Mitigation measures** |

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| | In order to reduce the impact of the described risks, the Project Team would set out to engage the stakeholders starting with the inception meeting and subsequent technical meetings with key technical partners. This project has been conceived through a collaborative effort of the NDMA (Vice President's Office) and UNESCO hence, from the very start, it has been clear that the Government will own the project and ensure its sustainability. As part of this effort, transfer of skills will focus on key NDMA Officers with technical capabilities and their regional officers.<br><br>The beneficiary communities would be carried along by ensuring that training materials meant for the educational and advocacy activities are in local languages. It is also important to note that UNESCO and the NDMA had reached out to some of the communities in 2018 and hence they are not strangers to the team.<br><br>To ensure the competence and abilities of those to engage as technicians for example in drone flights and photogrammetric analyses, the NDMA and UNESCO may engage skilled people from the tertiary institutions where there is a gap within the agency. |
| **2.9 Sustainability and exit strategy** | The majority of the results and benefits of the project will last beyond the end of the project. The main results of the project would be the flood early warning system at regional and community levels that to be owned and continued to be used national, regional and local levels after the project by the capacitated regional institutions and selected communities.<br><br>The fact that the main beneficiaries are also key partners and implementers of the project is a guarantee for sustaining the results of the project beyond the end of the project. As mentioned the involvement of the National Disaster Management Agency (NDMA) from the project proposal stage and of the targeted communities where the community flood early system will be established, will allow replicating and sustaining the project's activities on the long run. The awareness raising and capacity building activities will support that role.<br>Furthermore, the synergies sought with AGRHYMET will help linking the Gambian Basin management on the common regional platform for flood management in West Africa. |

| **3. Project Management** | |
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| **3.1 Project management and implementation** | The Project Management Team (PMT) consists of the national coordination and convening mechanisms (The Vice President's Office, the NDMA, the Gambia River Basin Authority (OMVG), and UNESCO Dakar office) the Gambia National Commission for UNESCO would be associated with the Project and would attend meetings on behalf of UNESCO whenever required. The NDMA will be the main implementing partner assisted by a skilled and experienced project management team (PMT). Based on the training UNESCO is providing to the AGRHYMET through ICHARM to serve as regional Centre of Excellence of Flood Early Warning Systems and capacity building, the institution would provide technical assistance for the selection and deployment of an early warning system necessary for regional harmonization as requested by the ECOWAS and for the preparation of capacity building materials. AGRHYMET has experience in implementing such kind of project with the participation of these river basin organisations.<br><br>All activities will be managed by the PMT under the overall supervision of UNESCO Dakar and the NDMA. The PMT would ensure as much as possible an appropriate participation of women to the trainings and various workshops and particularly during activities at community level. |

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| | In addition to the UNESCO Programme Specialist in Dakar, a coordinator (project appointment) and two administrative assistants (part time project appointment Dakar and Banjul) would be hired to be in charge of the day-to-day management of the project under the direct supervision of the project responsible officer in Dakar. The coordinator would coordinate with UNESCO Dakar, the NDMA and the main partners in the implementation of the project. The coordinator would be based in Banjul. |

| N° | Name or type of partner | Role |
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| 1 | The Vice President's Office, The Gambia | Political. Sustainability of the project. |
| 2 | National Disaster Management Agency (NDMA) | Main implementation partner for identification of appropriate national institutions to benefit, the implementation of national capacity building activities and for the overall maintenance and security of equipment procured during the project. |
| 3 | The Gambia River Basin Development Organisation (GRBDO/OMVG) | Main beneficiary and implementation partner providing necessary support for data, selection of experts and identification of appropriate stations |
| 4 | National hydro-meteorological services of the Gambia and the Gambia River Basin Development Organisation | Main beneficiary particularly hydrological services and implementation partner for capacity building, national platform and identification of appropriate experts |
| 5 | AGRHYMET Regional Centre | Implementation partner for capacity building and development of flood management package |
| 6 | The National Commission for UNESCO | Partnering with the Dakar Office for synergy of national interventions |

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| **3.2 Monitoring** | The Project Management Team composed of the Vice President's Office, the NDMA, the Gambia River Basin Authority (OMVG), the Indian representatives from the Honorary Consulate in Gambia or Indian Embassy in Senegal, and UNESCO Dakar office will undertake the monitoring of the implementation of the project to ensure adherence to plan and use feedback for corrective measures when problems are flagged. Regula meetings of the PMT will ensure rapid problem solving, adequate implementation in accordance to the agreed work plan and overall coordination.<br><br>Three narrative reports will be produced during the lifetime of the project and they include:<br>- The inception report after the workshop on the launching of the project and the various meetings of the project management team during the first trimester.<br>- Financial and narrative Reporting to be prepared every quarter.<br>- Monthly progress updates to be sent to the UNOSSC every month.<br>- The final project report at the end of the project<br>The reports shall focus on the extent to which progress was made towards the intended outputs, and that these remain aligned to appropriate outcomes including challenges and lessons learned.<br><br>Project progress reports and final report would be submitted to the Indian Delegation through the UNESCO HQ or as designated. |
| **3.3 Evaluation** | A project evaluation would be conducted at the end of the project and lessons learned would be shared internally and externally with partners. |
| | The visibility of the project will be ensured through the following means: |

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| **3.4 Visibility** | - Producing and disseminating of publicity documents (Brochures, leaflet, booklet, social media, Kakemonos, etc.) on the project. The dissemination would be also during workshops held by the project and other important workshops relevant to the project; The PMT would use all opportunities to disseminate information on the project.<br>- A monthly information letter on the project will be considered<br>- Invitation of the media (TV, Radio and News Papers) to any event organized by the project for a proper coverage of the event<br>-The inception workshop will be used to invite high-level officials (The Vice President of the Gambia, The Resident Coordinator of the UN system in the Gambia, and Heads of UN Agencies associated with Disaster related problem, the Indian Ambassador to the Gambia) from the different governments and regional organizations.<br>- A short film on the achievements of the project will be prepared and largely disseminated.<br>- The Government of India logo, India-UN Development Partnership Fund Logo, and the UNOSSC logo would be displayed on materials developed for visibility such as banners, kakemonos and brochures and wherever relevant.<br>All efforts would be made to acknowledge the contribution from the Government of India on appropriate occasions. For any major national event organized by the project arrangements would be made to ensure the participation of the Embassy of India in the country at the highest level as possible. The Embassy would be kept regularly informed on the progress of the project. Support of India would be mentioned in all publicity materials related to the project. |

**Annex A: Project Results and Legal Framework**
**Annex B: Timeline by key activity**
**Annex C: Risk analysis and mitigation**
**Annex D: Budget (by UNESCO outcome, output and/or key activity or by Category of Expenditure)**

**Annex A: Results Framework**

| **Impact:** The Gambia contributes to best practices in disaster risk reduction management and the SENDAI Framework Agenda | | | | |
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| **Quantitative and/or qualitative performance indicator (PI) (disaggregated by gender):** | **Baseline (B):** | **Source and means of verification (M):** | **Target (T):** | **Assumptions and risks** |
| PI 1. Loss of lives, livelihoods, and properties from floods reduced | 1.Affecting on average about 12,700 people every year, almost 0.62% of the total population of the country<br>2. Potentially affected GDP in flooded areas cumulative average almost 1.21% of the total GDP at country level. | 1. The Gambia Disaster Risk Profile (2018)<br>2. The Gambia, Standard Operating Procedure on Floods (2017)<br>3. The Gambia National Contingency Plan (2014)<br>4. Climate change-induced loss and damage in The Gambia, ICCCAD), Country Brief March 2016 | | N/A |
| **Outcome N° 1:** A pre- and post-disaster management system based on technology and people-centred in place and operational | | | | |
| **Quantitative and/or qualitative performance indicator (PI) (disaggregated by gender):** | **Baseline (B):** | **Source and means of verification (M):** | **Target (T):** | **Assumptions and risks** |
| PI 1. Number of drones, software and photographic equipment in place and certified drone pilots trained | 0 | Reports | 5 drones, software & photographic equipment, 15 trained drone operators, 30 experts trained on DEM and 3-D models | Adequately qualified persons in the Gambia |
| PI 2. Number of automatic stations and community early warning systems installed and number of managers and community members trained | 0 | Reports | Three automatic stations and at least 6 community Flood Early Warning systems and support equipment; at least 100 persons trained to use and report | Effort would be made to have maximum of women participating |
| PI 3. Number of people centred disaster activities including educational and sensitization activities with schoolchildren | 0 | Reports | At least 3000 schoolchildren, women and men reached with community based activities | Effort would be made to have maximum of women participating. Most vulnerable communities would be the main targets |

| Activities: | | | | Assumptions and risks |
|---|---|---|---|---|
| Inception workshop | | | | |
| Technical meetings of the Project Management Team with disaster-related agencies | | | | |
| **Output N°1: Drones used in pre- and post-disaster assessment, climate risk assessments and rapid identification of damages** | | | | |
| **Quantitative and/or qualitative performance indicator (PI) (disaggregated by gender):** | **Baseline (B):** | **Source and means of verification (M):** | **Target (T):** | **Assumptions and risks** |
| PI 1. Number of drones and equipment procured | 0 | Invoices and procurement documents | 5 drones, camera equipment and software | Provision of good specifications for equipment |
| PI 1. Number of persons certified to fly drones | 0 | Training workshop Report | At least 15 persons certified including 5 women | Availability of men and women with interest and ability to service as flight operators |
| PI 2. Number of technical training workshops conducted on DEMs and 3D visualizations of drone photogrammetry | 0 | Attendance lists | At least 5 different workshops from introductory GIS to advanced digital elevation modelling of landscapes and 3-D modelling | |
| PI 3. Number of pre-disaster data sets acquired with drones | 0 | Documents | At least three runs with drones at the most vulnerable areas during the period of the project | Well trained and capable operators who can operator with minimal supervision |
| **Activities:** | | | | **Assumptions and risks** |
| **Procurement of drones, related software, equipment and calibration** | | | | |
| **Drone flying certification course**<br>**Principles of UAV flight control**<br>Air Law & Regulations; Meteorology & Weather; Navigation & Air Space; Map Exercises; Aircraft Knowledge; Airmanship & Safety; Human Factors; Operating Procedure; Camera operations; Advanced flight manoeuvring; Detailed maintenance practices *Note: Course outline dependent on final specifications with training company. | | | | |
| **Conduct field-testing: Evaluate the outputs and approaches from the field-testing** | | | | |
| **Prepare a document with best practices as well as a roadmap to guide the implementation of a UAVs survey (to generate high-resolution images) in the Gambia.** | | | | |
| **Photogrammetry and Digital Elevation Models application Courses: Image processing principles**<br>Data capture and survey design - this will focus on the design of monitoring programmes for UAV data collection for generation of DOM\DEM and 3D model visualization (e.g. number and location of ground control points, flight height, image resolution and image footprint) | | | | |
| **Applications - Environmental applications (Courses)** | | | | |

| | | | | |
|---|---|---|---|---|
| - UAVs photogrammetry for wetlands monitoring<br>- UAVs photogrammetry for stream hydrology<br>- UAVs for catastrophe monitoring<br>- UAVs photogrammetry for ecological restoration | | | | |
| **Three quarterly drone runs for data acquisition pre-flood** | | | | |
| **Output N°2: End-to-end flood warning system in place.** | | | | |
| **Quantitative and/or qualitative performance indicator (PI) (disaggregated by gender):** | **Baseline (B):** | **Source and means of verification (M):** | **Target (T):** | **Assumptions and risks** |
| PI 1. Number of automatic stations with telemetry put in place and Community EWS stations | 0 | Report | Five fully automatic stations setup with telemetry linking to NDMA's central system | Affordable and easy to run by communities. AGRHYMET would be consulted in the setting up of the community EWS systems |
| PI 2. Number of operational manuals prepared for communities with EWSs | 0 | Report | At least one operational manual prepared in English and local language | |
| PI 3. Number of training workshops for operators | 0 | Report | Total of 10 to 20 selected from benefiting regions and communities | Low transfer or turnover rate of assigned staff to allow for stability of system |
| PI 4. Number of trainers trained on flood risk management including flood mapping and contingency planning | 0 | Report | At least 20 trainers trained selected from every community involved | |
| PI 5. Number of regional training conducted | 0 | Report | At least 12 regional training activities | |
| PI 6. Number of persons trained on FEW, flood mapping and contingency planning including at least 20% of women | 0 | Report | At least 150 | |
| **Activities:** | | | | **Assumptions and risks** |
| **Procurement of automatic stations and telemetry equipment** | | | | |
| **Construction of safe housing for EWS equipment at the sites** | | | | |
| **Setting up and testing of EWS and telemetry equipment** | | | | |
| **Preparation of training operational manuals in English and local languages** | | | | |
| **Training of operators of early warning systems** | | | | |
| **Organization of training of trainers workshops** | | | | |

| | |
|---|---|
| - **Training of trainers on FEW for 2 selected Gambians who shall lead the national training activities**<br>- **Two persons (Hydrologist and Hydro-meteorologist) spend 30 days at AGRHYMET to develop and set up the Gambian flood early warning system on the Data Integration and Analysis System (DIAS) platform for the Gambia Basin.**<br>- **Training course on flood risk management including flood mapping and contingency planning**<br>- **National training on flood risk management**<br>- **Translation of training documents into local languages**<br>- **Community training workshops on flood risk management** | |

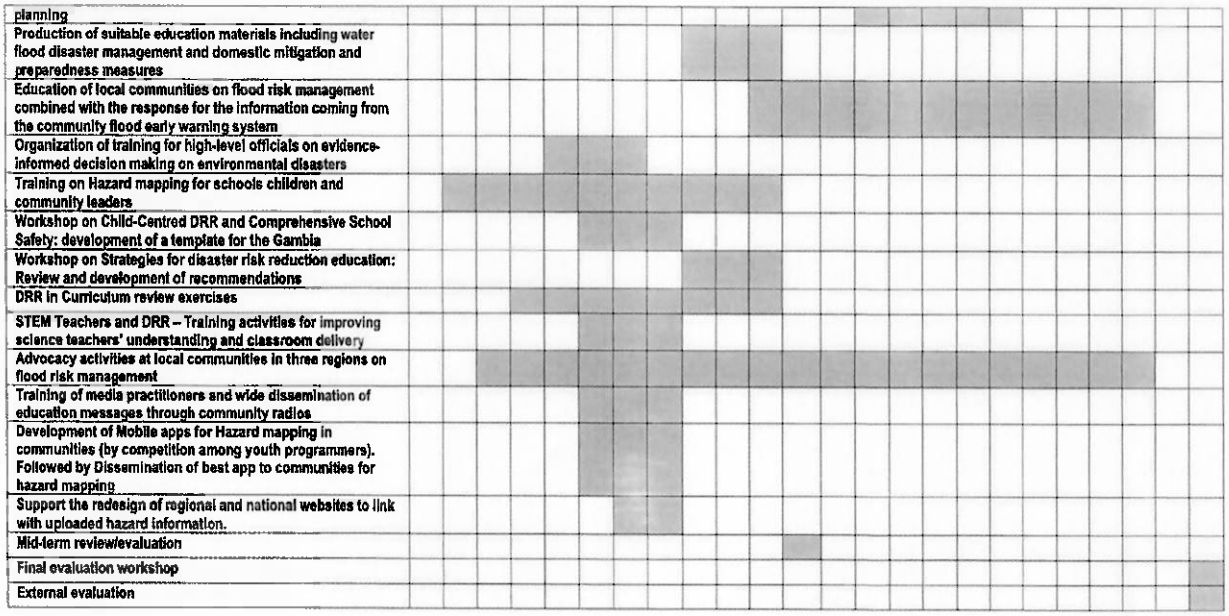
**Output N°3: People-centred early warning system functioning.**

| Quantitative and/or qualitative performance indicator (PI) (disaggregated by gender): | Baseline (B): | Source and means of verification (M): | Target (T): | Assumptions and risks |
|---|---|---|---|---|
| PI 1. Number of senior officials trained on evidence-informed decision making for disasters and environmental management | 0 | Report | At least 50 senior officials from environment-related ministries and agencies trained on evidence-informed decision making | |
| PI 2. Number of hazard mapping activities conducted for primary, secondary and community leaders | The NDMA has experience but need to bring in best practice to hazard mapping | Report | 3000 of at least 1000 women | |
| PI 3. Number of times DRR community radio programmes aired | 0 | Report | Once every week for at least 18 months during the project lifet.me | Community radios are available |
| PI 4. Number of persons educated and sensitized including at least 30% of women | The NDMA has some community advocacy material which will be updated | Report | Appropriate DRR training materials available and at least 3000 persons with at least 1000 women reached | Effort would be made to have mobilized a maximum number of women |
| PI 5. Number of persons using locally developed mobile application for hazard mapping | 0 | Report | Mobile app development competition with the winning app installed in phones of community members participating in hazard mapping exercises | |
| PI 6. Creation of Community Web sites for posting of information from hazard mapping exercises | 0 | Report | Number of community sites for linked to regional DRR manager's offices for hazards information | |

| Activities: | Assumptions and risks |
|---|---|
| Organization of training for high-level officials on evidence-informed decision making on environmental disasters | |
| Training on Hazard mapping for schools children and community leaders | |
| **Education related activities including:**<br>- Workshop on Child-Centred DRR and Comprehensive School Safety: development of a template for the Gambia<br>- Workshop on Strategies for disaster risk reduction education: Review and development of recommendations<br>- DRR in Curriculum review exercises<br>- STEM Teachers and DRR – Training activities for improving science teachers' understanding and classroom delivery | |
| Production of suitable education materials including water flood disaster management and domestic mitigation and preparedness measures Production of suitable education materials including water flood disaster management and domestic mitigation and preparedness measures | |
| Education of local communities on flood risk management combined with the response for the information coming from the community flood early warning system | |
| Advocacy activities (distribution of educational flyers and promotional materials, radio and TV talks, youth and women discussion groups) at local communities in three regions on flood risk management | |
| Training of media practitioners and wide dissemination of education messages through community radios | |
| Development of Mobile apps for Hazard mapping in communities (by competition among youth programmers). First prize $2,000, 2nd Prize $1000 and 3rd Prize $500. Followed by Dissemination of best app to communities for hazard mapping | |
| Support the redesign of Regional and national websites to link with uploaded hazard information. | |

## Annex B: Timeline

| Key Activities | Months | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| Put the project team in place | | | | | | | | | | | | | | | | | | | | | | | | |
| Inception workshop | | | | | | | | | | | | | | | | | | | | | | | | |
| Technical meetings of the Project Management Team with disaster-related agencies | | | | | | | | | | | | | | | | | | | | | | | | |
| Procurement of drones, related software, equipment and calibration | | | | | | | | | | | | | | | | | | | | | | | | |
| Drone flying certification course: Principles of drone flight control | | | | | | | | | | | | | | | | | | | | | | | | |
| Conduct field-testing: Evaluate the outputs and approaches from the field-testing | | | | | | | | | | | | | | | | | | | | | | | | |
| Prepare a document with best practices as well as a roadmap to guide the implementation of a drone surveys. | | | | | | | | | | | | | | | | | | | | | | | | |
| Photogrammetry and Digital Elevation Models application Courses: Image processing principles | | | | | | | | | | | | | | | | | | | | | | | | |
| Applications - Environmental applications (Courses) | | | | | | | | | | | | | | | | | | | | | | | | |
| Drone runs for data acquisition pre-flood and post-flood analyses and learning | | | | | | | | | | | | | | | | | | | | | | | | |
| Procurement of automatic stations and telemetry equipment and setting up | | | | | | | | | | | | | | | | | | | | | | | | |
| Setting up and testing of early warning system and telemetry equipment | | | | | | | | | | | | | | | | | | | | | | | | |
| Preparation of training operational manuals in English and local languages | | | | | | | | | | | | | | | | | | | | | | | | |
| Training of operators of early warning systems | | | | | | | | | | | | | | | | | | | | | | | | |
| Training of trainers on Flood early warning system based on the Data Integration And Analyses System (DIAS) for 2 selected Gambians at AGRHYMET in Niger Republic | | | | | | | | | | | | | | | | | | | | | | | | |
| Development and setting up of the Gambian flood early warning system on the Data Integration and Analysis System (DIAS) platform for the Gambia Basin. | | | | | | | | | | | | | | | | | | | | | | | | |
| National training of trainers for community educational activities on flood risks management, | | | | | | | | | | | | | | | | | | | | | | | | |
| National and regional training workshops on flood risk management including flood mapping and contingency | | | | | | | | | | | | | | | | | | | | | | | | |


planning
Production of suitable education materials including water flood disaster management and domestic mitigation and preparedness measures
Education of local communities on flood risk management combined with the response for the information coming from the community flood early warning system
Organization of training for high-level officials on evidence-informed decision making on environmental disasters
Training on Hazard mapping for schools children and community leaders
Workshop on Child-Centred DRR and Comprehensive School Safety: development of a template for the Gambia
Workshop on Strategies for disaster risk reduction education: Review and development of recommendations
DRR in Curriculum review exercises
STEM Teachers and DRR – Training activities for improving science teachers' understanding and classroom delivery
Advocacy activities at local communities in three regions on flood risk management
Training of media practitioners and wide dissemination of education messages through community radios
Development of Mobile apps for Hazard mapping in communities (by competition among youth programmers). Followed by Dissemination of best app to communities for hazard mapping
Support the redesign of regional and national websites to link with uploaded hazard information.
Mid-term review/evaluation
Final evaluation workshop
External evaluation

**Annex C : Risk Analysis and Mitigation**

| S/n | Description of the risk | Likelihood: Low, Medium, High | Impact: Low, Medium, High | Measures of mitigation or risk management plan | Risk Owner |
|---|---|---|---|---|---|
| 1 | The beneficiaries and communities have erroneous expectations | LOW | MEDIUM | Use the Project Inception meeting and advocacy activities to create full awareness of the objectives and outcomes of Project. Communicate in writing where necessary. | PMT and NDMA |
| 2 | Trainees are inexperienced and unable to assimilate the knowledge passed down in the courses. | LOW | HIGH | Undertakes to analyze capabilities and skills of the participants before inviting them to training courses. | PMT and NDMA |
| 3 | Design of the project lacks flexibility | LOW | MEDIUM | Ensure that feedback from beneficiaries and participants are used for purposes of correction | PMT |
| 5 | The project does not take into account the culture of The Gambia. | LOW | HIGH | Cultural sensitivity will be considered as an important part of the implementation of community-based activities. Translation into local languages will be used whenever needed. | PMT |
| 6 | Ownership is not clearly defined | LOW | HIGH | Strengthen the involvement of the Vice President's Office which is responsible for the National Disaster Management plans in the country and is the direct supervisor of the national Disaster management Agency | PMT and NDMA |

**ANNEX D1: Overall scope of resources by output**

| OUTPUT | Total (US$) |
|---|---|
| | |
| **Output N°1: Drones used in pre- and post-disaster assessment, climate risk assessments and rapid identification of damages** | **300,030** |
| **Output N°2: End-to-end flood warning system in place.** | **404,331** |
| **Output N°3: People-centred early warning system functioning.** | **384,469** |
| **Support Costs (7%)** | **76,218** |
| **TOTAL BUDGET** | **1,165,048** |
| **UNDP GMS (3%)** | **34,951.54** |
| **GRAND TOTAL** | **1,199,999.54** |