

## Technical Assistance Closure Report

### Closure Report for CTCN Technical Assistance by Globalcad (globalcad.org), WE&B (weandb.org), Meteosim (meteosim.com) and WASCAL (wascal.org)

#### 1. Basic information

Title of response plan	<b>Assessment of Coastal Hazards and Climate Change Adaptation Technologies for the Coastal Region of West Africa and Cameroon Using the Coastal Hazard Wheel (CHW)</b>
Technical assistance reference number	<b>2017000034</b>
Country / countries	Benin, Cameroun, Cote d'Ivoire, Gambia, Ghana, Guinea, Senegal, Togo
NDE focal point and organisation	<ul style="list-style-type: none"> <li>- NDE Benin : Raphiou Adissa Aminou Email : <a href="mailto:anminou_raphiou@yahoo.fr">anminou_raphiou@yahoo.fr</a></li> <li>- NDE Cameroun : Mr. Forghab Patrick Mbomba Email : <a href="mailto:forghabp@yahoo.fr">forghabp@yahoo.fr</a></li> <li>- NDE Cote d'Ivoire : Philippe Kumassi Kouadio Email : <a href="mailto:kumasphil@gmail.com">kumasphil@gmail.com</a></li> <li>- NDE Gambia : Lamin E. Jatta Email : <a href="mailto:laminj@ymail.com">laminj@ymail.com</a> / <a href="mailto:kobebe@gmail.com">kobebe@gmail.com</a></li> <li>- NDE Ghana : Joseph Amankwa Baffoe Email : <a href="mailto:jabaffoe@gmail.com">jabaffoe@gmail.com</a></li> <li>- NDE Guinea : Mamady Kobélé Keita Email : <a href="mailto:kobebe@gmail.com">kobebe@gmail.com</a></li> <li>- NDE Senegal : Issakha Youm Email : <a href="mailto:iyoum2@yahoo.fr">iyoum2@yahoo.fr</a></li> <li>- NDE Sierra Leone: Abdul Salim Email : <a href="mailto:abdul_salim007@yahoo.co.uk">abdul_salim007@yahoo.co.uk</a></li> <li>- NDE Togo : Mery Yaou Email : <a href="mailto:ymer69@yahoo.fr">ymer69@yahoo.fr</a></li> </ul>
Proponent focal point and organisation	<p>West African Coastal Observation Mission (WACOM) Tel: Office: +221 338258066 / GSM: +221776584926 Fax: +221 338258168 Email : <a href="mailto:sall@cse.sn">sall@cse.sn</a>/<a href="mailto:sall_moussa@hotmail.com">sall_moussa@hotmail.com</a> MOLOA/WACOM, Centre de Suivi Ecologique, Rue Leon Gontran Damas, BP 15 532, Fann Résidence, Dakar, Sénégal</p>
Designer of the response plan	<b>WACOM – CTCN</b>
Implementer(s) of technical assistance	<p><b>Globalcad</b> - <a href="https://globalcad.org/en/">https://globalcad.org/en/</a>  <b>WE&amp;B</b> - <a href="http://weandb.org">weandb.org</a>  <b>Meteosim</b>- <a href="https://www.meteosim.com">https://www.meteosim.com</a>  <b>WASCAL</b> - <a href="https://wascal.org">https://wascal.org</a></p>
Beneficiaries	<b>WACOM National Antenas from</b> Benin , Cote d'Ivoire, Gambia, Ghana, Guinea, Senegal, Togo and Technical Counterpart from Cameroun
Sector(s) addressed	<b>Early Warning and Environmental Assessment Coastal Zones</b>
Technologies	Hazard mapping – Coastal Hazard Mapping (Coastal Hazard Wheel)

supported	<p>Protection (soft engineering): Wetland restoration, Coastal zoning, Ecosystem based management, Fluvial sediment management, Dune rehabilitation, Beach Nourishment</p> <p>Protection (hard engineering): Dykes, Breakwaters</p>
Implementation period and total duration in months	<b>January 2019-December 2019, 12 months</b>
Total budget for implementation	<b>USD 298,530</b>
Description of delivered outputs and products as well as the activities undertaken to achieve them. In doing so, review the log frame of the original response plan and refer to it as appropriate	<p><b>Output 1: Development of implementation planning and communication documents</b></p> <ul style="list-style-type: none"> <li>i) A detailed work plan of all activities, deliveries, outputs, deadlines and responsible persons/organisations and detailed budget to implement the Response Plan based directly on this Response Plan;</li> <li>ii) Based on the work plan, a monitoring and evaluation plan</li> <li>iii) A two-page CTCN Impact Description;</li> <li>iv) A Closure and Data Collection report completed at the end of the technical assistance.</li> </ul> <p><b>Deliverable 1 (February 28, 2019 and December 20, 2019):</b></p> <ul style="list-style-type: none"> <li>i) Detailed work plan</li> <li>ii) Monitoring and evaluation plan</li> <li>iii) CTCN Impact Description</li> <li>iv) Closure and Data Collection report</li> </ul>
	<p><b>Output 2: The national and WACOM coordination unit's databases are updated with CHW (including Cameroon's)</b></p> <p><b>Activity 2.1: Conduct a comprehensive collection, evaluation and analysis of available national and regional data and their integration into the CHW system</b></p> <p>The implementation of the CHW method involves the mobilization of a mass of information of various kinds including coastal geomorphology data, oceanographic data (tides, swells, storms ...), climate, sedimentology (sediment balance), biodiversity (flora and marine and coastal fauna), socio-economic (economic activities, dynamics and social vulnerabilities, socio-economic surveys) and integrated coastal zone management measures.</p> <p>As part of this activity, the CTCN experts accompanied the experts of the national antennas and the WACOM regional coordination unit and the Cameroon Technical Counterpart in the analysis and the exhaustive evaluation of the <b>availability, quality and the reliability of existing data</b>. In a practical way, the CHW Expert, project coordinator and coastal risk expert, developed a guide for evaluating, processing and analyzing the available data and how to integrate it into the CHW system. Gaps in information and data were also identified as well as continuous data collection schemes.</p> <p>Thus, at the level of each country and on the basis of the guide, a work of collection and inventory of available data, pretreatment and preliminary analysis was be carried out by the experts of theCTCN and WACOM National Antennas and the Cameroon Technical Counterpart, which facilitated the work of Activity 1.2. (Regional Workshop). This work done by the technical antennas was shared</p>

with the experts of the CTCN.

In parallel, an evaluation study of the management of the gender issue in the planning and management of coastal risks in West Africa and Cameroon was carried out. This assessment identified specific vulnerabilities and needs related to gender in particular in terms of access to resilience actions, funding mechanisms and proposed capacity building programs, with the aim of providing differentiated responses. This study explored the following main evaluation questions: (i) To what extent is vulnerability gender-specific in the West African and Cameroonian coastal area? (ii) How does WACOM countries and Cameroon perceive and deal with vulnerability and resilience to coastal risks, taking into account gender? (iii) How do WACOM countries and Cameroon intend to change the gender roles in coastal risk planning and management? (iv) How do WACOM countries and Cameroon measure changes in gender roles in coastal risk management? and (v) What are the factors that encourage changes in gender roles (drivers of change) and what are the limitations and challenges?

**Activity 2.2: Organize a regional training session for the focal points of the national antennas and the regional coordination unit of MOLOA as well as the Technical Counterpart of Cameroon on the methodology and the practical application of the CHW tool**

The update of the UEMOA regional study (2016) clearly underlined the weakness of national and regional technical and institutional capacities in terms of typology and coastal risk assessment and their integrated management, and also the multifaceted nature and uncertainty of the data available. In addition, this study recognized the need for scientific monitoring through a methodology based on a set of harmonized indicators applied at both national and regional level. Thus, in the context of the West African coastline characterized by climatic uncertainties and weak data, the CHW method is a relevant tool. However, its implementation requires the strengthening of national and regional capacities.

Following the initial work of inventorying, collecting and evaluating available data according to their conformity with the CHW system, and identifying the gaps to be filled, a regional online workshop in French (May 2<sup>nd</sup>) and English (May 6) gathering the 9 National Focal Points and the Regional Coordination Unit was organized on the to familiarize the WACOM National Focal Points and the Cameroon Technical Counterparty with the CHW. Beyond the theoretical and practical aspects of training on the CHW tool, this workshop evaluated, validated and harmonized at the sub-regional level the approach and the procedures for collecting, processing and disseminating data.

As part of this training workshop, a specific training module on gender mainstreaming and assessment in coastal risk planning and management programs and policies was provided.

**Activity 2.3: Train the experts of the national antennas and the regional coordination unit of WACOM as well as the Technical Counterpart of Cameroon and relevant researchers on the data management available in the CHW system for risk mapping and adaptation options**

After the inventory, aggregation and evaluation of available data and harmonization of procedures for collecting, processing and sharing information, online training sessions (two training series, one in English and one in French) on the CHW were organized for the benefit of the national branches of WACOM and the Technical Counterpart of Cameroon. **The CTCN experts trained 129 experts from the national branches and the regional unit of WACOM and the technical team of Cameroon (15 experts per country) on the method and its practical application from Monday 08th of July to Friday 26th of July.**

The results were shared with the CTCN experts who integrated them into the work of adaptation options and recommendations of **activities 3.1 and 3.2.**

**Activity 2.4: Update the classification and mapping of coastal risks and adaptation options (including Early Warning Systems), using the CHW and / or Google Earth web application**

The results of the data evaluated and processed during the practical trainings at national and regional level led to the conclusion the data were not sufficient to perform the Coastal Hazard Wheel at steps 2 or 3 at local level due to lack of availability and quality of local data. It was therefore decided, in agreement with WACOM countries and the CTCN, to realize the CHW mapping at step 1 from remote data publicly available. In accordance with the original CHW document (Appelquist et al., 2016), the classification and mapping of risks and adaptation options were based on the general functions available in ArcGIS, diachronic satellite images and numerical model available in Google Earth, which was easily accessible.

A detailed classification of the typology of the West African coastline and risk areas was organized in the eight (08) countries involved in the technical assistance in order to identify the corresponding technologies needed for **activity 3.1**. This CHW classification was provided to the WACOM and Cameroon National Climate Change Observatory in order to be integrated into the databases and updated on a continuous basis, for the benefit of country offices and regional coordination for planning and integrated management of West Africa and Cameroon coastal zones.

The results of the updating of the WACOM database and the Cameroon National Observatory of Climate Change and of the classification and risk assessment were presented in the form of statistical tables on the typology and levels of major risks and a series of 5 national and regional overview maps including (i) national and regional maps of the risks of ecosystem disruption; (ii) national and regional maps of flood risk due to climate change; (iii) national and regional coastal erosion risk maps, (iv) national and regional salt water intrusion risk maps, and (v) national and regional flood hazard maps in relation to sudden changes in climatic factors (storm surges, extreme tides).

**Deliverable 2:**

- i) Report of the comprehensive evaluation and analysis of available national and regional data and their integration into the CHW system

	<p>(July, 27, 2019)</p> <ul style="list-style-type: none"> <li>ii) Evaluation study on the management of gender issues in coastal risk planning and management in West Africa and Cameroon (July, 27, 2019)</li> <li>iii) Collection and inventory work of available data, pre-processing and preliminary analysis (shared by technical antennas) (July, 27, 2019)</li> <li>iv) Report of the training of at least 11 experts (including 9 national focal points and 2 from the regional coordination) on the CHW at a regional workshop online (PPT) (July, 27, 2019)</li> <li>v) Report on the training of at least 135 experts from the national offices and the regional coordination unit of WACOM and Cameroon (October, 25)</li> <li>vi) Comments from the technical antenna of validation of the application to the local conditions (October, 25)</li> <li>vii) Report on the updating of the databases of the nine (09) national databases and WACOM's regional coordination unit (October, 25)</li> <li>viii) Detailed classification and mapping of coastal hazards (production of national and regional maps and statistical tables) of the West African coastline and Cameroon's (October, 25)</li> </ul>
	<p><b>Output 3: Specific adaptation options and technologies most appropriate for coastal risks are identified and promoted</b></p> <p><b>Activity 3.1: Identify, evaluate and formulate a series of recommendations for technological options to be implemented for the sustainable management of the main identified coastal risks</b></p> <p>The implementation of this activity was combined with Activity 2.4, in a regional workshop for 10 Experts (including 8 National Focal Points and 2 Regional Coordinators) concerning the updating of the classification and mapping of coastal risks and adaptation options, using the CHW and Google Earth web application. Thus, in addition to the coastal risk classification and mapping exercise, a work of identifying options and appropriate adaptation technologies for the sustainable management of the main risks was also carried out simultaneously. With relation to the classification and assessment of coastal risks carried out in <b>Activity 2.4, a corresponding mapping of appropriate adaptation options and technologies was developed conducting to the pre-identification of 24 options</b> that could contribute to improved planning and integrated management of the West African coastline.</p> <p>Following this inventory and assessment work by CTCN experts, <b>a list of 08 relevant strategic options, measures and or technologies was recommended</b> for their implementation in the context of future programs and projects of WACOM and Cameroon. For each strategic technology option selected, the following were detailed: (i) the definition of the technology; (ii) the description of the technology; (iii) the benefits; (iv) the disadvantages; (v) financial costs and needs; (vi) the institutional and organizational capacities required; (vii) factors hindering its implementation; (viii) the factors favoring its implementation; and (ix) a case study.</p>

	<p><u>On the basis of the gender assessment study conducted in <b>Activity 2.1.</b>, these recommendations took into account the main findings and perspectives of gender mainstreaming in the planning and implementation of adaptation technologies in coastal areas of West Africa and Cameroon.</u></p> <p><b>Activity 3.2: Formulate recommendations for a better optimization of the future application of the CHW tool in the context of MOLOA and Cameroon</b></p> <p>The implementation of the CHW in this first phase allowed drawing lessons in terms of achievements but also to identify weaknesses, difficulties and gaps in the data available. On the basis of this progress report, recommendations were be made for the update of data on coastal risks, the optimization of the use of the tool, the preparation of standardized reports for each of the nine countries. In addition, drawing on the lessons and good practices from this experience, relevant recommendations were made for other countries and regions who would like to use the CHW.</p> <p>The recommendations related to: (i) the typology of the data; (ii) procedures for collection and processing and interpretation of physical, social and economic data; (iii) handling the Wheel software; (iv) the format and quality and frequency of submission of reports</p> <p><b>Activity 3.3. Organize a final regional workshop for sharing and capitalizing technical assistance</b></p> <p>At the end of the technical assistance, a final workshop was organized in Dakar on November 27 and 28 (with simultaneous translation) for the presentation and capitalization of the results. The main targets of this regional sharing and capitalization workshop were the NDEs, the WACOM national branches and the WACOM Regional Coordination Unit and Cameroon’s technical counterpart. However, CTCN experts ensured the participation of regional initiative representatives and relevant donors to enable the NDEs and WACOM to present adaptation options and recommendations formulated during CTCN technical assistance. Participants included WACA representatives, IUCN-WACA FFEM , PRCM, Abidjan Convention, etc.</p> <p><b>Deliverables 3 (December, 13 2019):</b></p> <ul style="list-style-type: none"> <li>i) Report of the Regional Workshop on Updating Classification and Mapping of Coastal Risks and Adaptation Options for 10 Experts (including 8 National Focal Points and 2 Regional Coordinators)</li> <li>ii) Eight adaptation technology options were identified, assessed and considered appropriate for the management of specific risks and recommended for their implementation</li> <li>iii) A report presenting a series of recommendations on indicators and the process to be followed to continue to use the tool and update the data on a regular basis at national (one country report) and at the regional level</li> <li>iv) Report of the final regional sharing and capitalization workshop</li> </ul>
Methodologies applied to produce outputs and products	<ul style="list-style-type: none"> <li>• On line survey (activity 2.1)</li> <li>• Structured interviews (Activity 2.1)</li> <li>• On-line webinars (Activity 2.2; 2.3; 2.4; 3.1)</li> </ul>

	<ul style="list-style-type: none"> <li>Coastal Hazard Wheel (mapping of coastal hazards)</li> </ul>
Deviations	<p>No deviations in the outputs.</p> <p>The only deviation was in the activity 2.4 (mapping of costal hazards), which was intended to be prepared by the experts of the national antennas with the support of CTCN experts. Given the lack of accessibility to data and national capacity (no funding, lack of human resources, etc.) the CTCN group of experts decided in agreement with WACOM National Antenas and CTCN/UNIDO counterpart, to realized the mapping of the 8 countries themselves at step 1 of Coastal Hazard Wheel.</p>
Anticipated follow-up activities and next steps	<p>WACOM and Cameroon are expecting significant benefits from this technical assistance with the establishment of a regional and national integrated coastal area management and data sharing system using the CHW, which offers a tool management of major coastal risks and standardized communication of coastal information for a multiplicity of actors. The achievements of the CHW provide a solid basis for the consolidation of regional cooperation in the integrated management of West African and Cameroon coastal zones and the facilitation of the prioritization of specific and appropriate management measures. This should allow WACOM and Cameroon to better communicate adaptation challenges and needs to international financial institutions and the global climate community.</p> <p>In the short term (within one year, horizon January 2021), the application of the CHW will allow WACOM and Cameroon's Technical Counterpart to accelerate their efforts to coordinate and coherence actions for an integrated management of the West African and Cameroonian littoral and to consolidate (update continuously) their decision-making base for the adoption of national and regional adaptation measures and options. The Coastal Hazard Wheel is intended to become the method used when the West African <i>Coastal Observation Mission</i> becomes the <i>West African Coastal Observatory</i>.</p> <p>In order to do so the countries will need to It will be necessary for the WACOM countries to name a national coordinator (preferably WACOM National Antenna), who will be responsible of CHW implementation and interaction with other related stakeholders.</p> <p>In-person trainings should be organized at national and/or regional level in order to ensure the mappings and identification of management options can be performed at national level at step 2 or 3.</p> <p>This will imply mobilizing funds with relevant partners (such as WACA program) in order to strengthen capacities.</p> <p>In concrete terms, putting into practice the data, knowledge and skills acquired in the context of the technical assistance provided by the CTCN should allow, in the long term:</p> <ul style="list-style-type: none"> <li>- The updating of at least 5 Coastal Master Plans;</li> <li>- The updating and / or elaboration of nine (08) national plans of adaptation actions of the coastal zones;</li> <li>- The implementation of 08 adaptation technologies appropriate to the priority coastal risks;</li> <li>- The continuous updating of the regional and national databases;</li> <li>- Strengthening the resilience capacity of at least 3,000,000 people living in coastal areas of West Africa and Cameroon as a result of improved planning and integrated management and implementation of appropriate technological adaptation measures and options.</li> <li>- Reducing the number of property damage and loss of life caused by coastal floods; In 2012, coastal flooding affected 500,000 and 30,000 people living on the West African coast and the Cameroon coastal zone, respectively (World Bank, 2012 and ACHOA, 2012). According to ECA / CAPC (2014), the different</li> </ul>

	<p>adaptation scenarios would lead to "residual damage" whose annual cost would be estimated at between 3 and 6% of Africa's GDP by 2080<sup>1</sup>. According to the UNDP and the World Facilitation Fund, for disaster and disaster prevention and recovery in Senegal, damage and losses in 2009 amounted to 44 billion FCFA, of which 35.5 billion only for Dakar (IED / PRESA, 2015)<sup>2</sup>. In 2014, the ORSEC plan and Senegal's ten-year flood management program (PDGI) had cost CFAF 700 billion (GFDRR 2014)<sup>3</sup>.</p> <ul style="list-style-type: none"> <li>- And the reduction of salt intrusion (salt wedge) to increase agricultural productivity, access and availability of drinking water.</li> </ul>
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## 2. Lessons learned

	Lessons learned	Recommendations
Lessons learned from the CTCN TA process	<p><i>Main lessons learned from following the steps of the TA process and interacting with the CTCN Secretariat:</i></p> <ul style="list-style-type: none"> <li>• Elaborate a solid work plan based on profound understanding and appropriation of T.A. response plan</li> <li>• Given the ambitious program (training 8 countries on Coastal Hazard Wheel and mapping their Coastal Hazards) focus on the deliverables in order to ensure to maintain work plan.</li> </ul> <p><i>Main challenges:</i></p> <ul style="list-style-type: none"> <li>• Distance and working remotely with National antennas until the final in-person workshop with inherent connectivity challenges;</li> <li>• Time-wise, too ambitious program for the National Antennas: the time was not sufficient for them to be trained <i>and</i> perform the mapping of coastal hazards at national level</li> <li>• Changes in the CTCN counterpart (maternity leave, professional changes)</li> <li>• Overlap of closure of project with COP in Madrid</li> </ul> <p><i>Success-factors:</i></p> <ul style="list-style-type: none"> <li>• Solid expertise of the implementation team in different fields and experience in West Africa</li> <li>• Decision of the experts team to realize themselves the mapping of coastal hazards (instead of national antennas experts) in order to be able to produce mappings on time and identify management options.</li> </ul>	<p><b>Recommendation 1:</b> Assess the level of availability of the national counterparts (time, human resources, funding, connectivity) in order to determine their level of engagement in a process and if they will be available/able to implement foreseen actions by the T.A.</p> <p><b>Recommendation 2:</b> If no sufficient availability is expected, allocate budget of the T.A. for supporting their participation and availability in the process through reinforcing their human resources and other specific needs;</p>
Lessons	<b>Strengths and weaknesses of the CHW</b>	<b>Recommendation 1: name a national</b>

<sup>1</sup> CEA-CAPC. 2014. Pertes et dommages en Afrique. 67 p.

<sup>2</sup> IED/PRESA, 2015. Gestion des risques climatiques. Rapport d'étude, 56 p.

<sup>3</sup> GFDRR. (2014). Sénégal, inondations urbaines. Le Relèvement et la Reconstruction à partir de 2009. Etude de case pour le Cadre de relèvement post catastrophe Juillet 2014, 27 pages.

<p>learned related to climate technology transfer</p>	<p><b>method</b></p> <p><b>STRENGTHS</b></p> <p><b>1) Typology of the data</b> - The CHW methodology can be used at three different levels (called steps in the CHW methodology), according to the availability of local information. Data availability in the eight countries is very uneven, yet it was possible to produce valid coastal risk maps.</p> <p><b>2) Procedures for collection, processing and interpretation of data</b> - The method proposes a relatively simple procedure for collecting, processing and interpreting the data..</p> <p><b>3) Handling the Coastal Hazard Wheel software</b> - Due to the qualitative character of the method, it is relatively simple to apply, even by not highly specialized users in coastal mapping techniques. The implementation of the methodology is not technologically demanding. It can be implemented with nearly any geographical information system (GIS) and, due to the existence of several open source GIS (e.g. QGIS), required software can be freely accessed. They can be run in a standard PC, so no high-performance (costly) computers are required.</p> <p>Coastal hazards and the risk magnitude identified through the application of CHW have become very useful to initially identify vulnerable coastal areas from a physical and environmental perspective. It allows making a preliminary identification of suitable management options to face the identified hazards.</p> <p><b>WEAKNESSES</b></p> <p><b>1) Socio-economic aspects</b> The CHW does not take into account socio-economic aspects as well as political appropriateness for the selection and prioritization of the management options. In consequence, even for the implementation of CHW at step 1, the method would benefit greatly from having a set of rapid social and economic assessment. These aspects will be not only relevant for selection management options, but to convert hazards to expected societal impacts and then to have more elements to make informed decisions.</p> <p><b>2) Limited number of management options</b> Despite the fact that the CHW method provides a good set of adaptation options,</p>	<p><b>coordinator (preferably WACOM National Antenna), who will be responsible of CHW implementation and interaction with other related stakeholders</b></p> <p>This person will be in-charge of identifying and contacting all the needed partners at national level (other ministries, local partners, academic centres, etc.) for further implementation of the Coastal Hazard Wheel, liaising with other countries. He/she should be responsible for circulating the preliminary results of the mapping at step 1 conducted under this assignment in order to engage partners for the mapping at step 2 or 3. This national coordinator would also be responsible for informing about trainings, events, opportunities and results from mappings conducted in other countries.</p> <p><b>Recommendation 2: create a scientific committee or Coastal Hazard Wheel committee in order to coordinate the further implementation of the method.</b></p> <p>This committee should integrate all the relevant stakeholders involved in the implementation of the mapping of the coastal wheel. Beyond the mere implementation of the method, it would be instrumental to share lessons learned and recommendations for improvement. It will also play a key role in communicating the results to the most appropriate stakeholders in order to raise awareness on the need to increase the level of engagement towards coastal risk management.</p> <p><b>Recommendation 3: Organize in-person trainings at national and/or regional level in order to ensure the mappings and identification of management options can be performed at national level</b></p> <p>The Technical Assistance allowed training national focal points and more than 135 experts from the national offices and the regional coordination unit of WACOM and Cameroon. Yet, this training is not deemed sufficient to guarantee mappings at step 2 or 3 could be successfully performed at national or regional level. A series of in-personal trainings should be organized to train designated responsible technicians and other practitioners in order to ensure they are operational for its implementation.</p> <p><b>Recommendation 4: realize a CHW risk mapping at step 2 and/or step 3</b></p> <p>While the result of the CHW implementation at step 1 is relevant and supportive for the</p>
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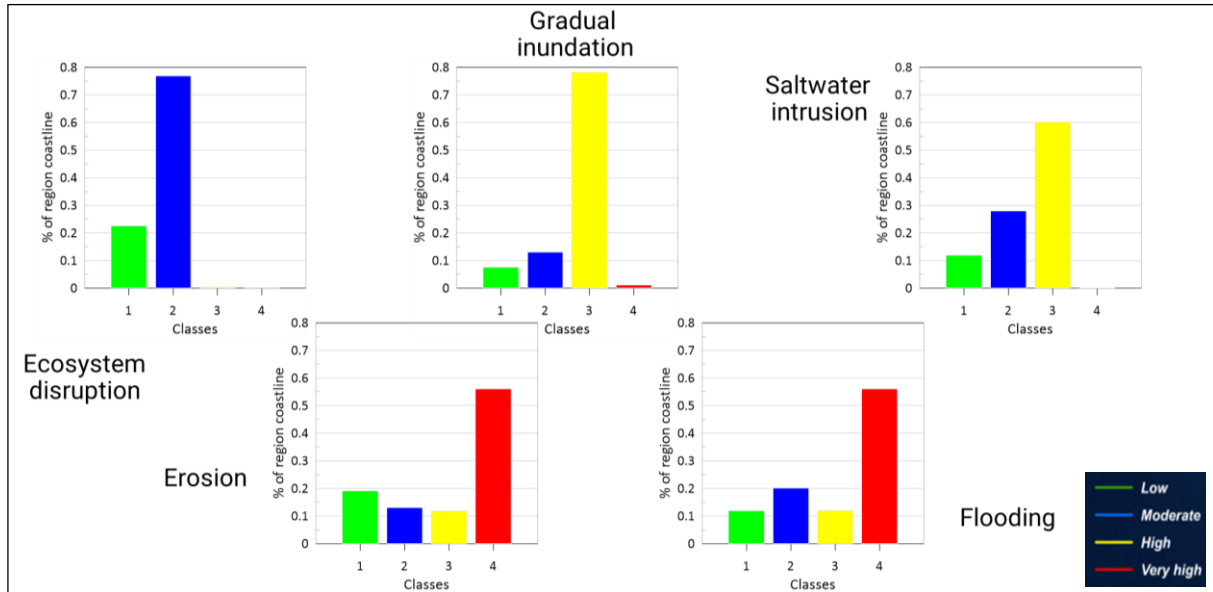
	<p>the number of options proposed are fixed and therefore limited. Some adaptations options are not integrated in the method and could easily be integrated in order to expand the list of potential management options. For example, there is no provision for governance or political implications, a “Marine Protected Area” could potentially enhance the coastal protection in the area and thus reduce the hazard.</p> <p><b>3) Climate Change</b> The CHW method does not explicitly take into account the regional long-term variability on the climate signal in some critical CHW parameters such as waves, tides and storms to define the coastal hazards. Thus, any climate change induced variation in any of these variables will result in a modification of the expected hazards and thus in the coastal vulnerability. Moreover, the method does not explicitly consider other new forces such as sea level rise, which may largely modify the expected coastal vulnerability. All of this result in a method able to assess the coastal vulnerability to considered hazards under current climate but with some deficiencies to do it under climate change.</p> <p><b>4) Limitations of the information provided</b> Given the nature of the method and local characteristics of hazards, the results of CHW must be presented as a first assessment which must be treated as it is, a starting point. The selection of the most suitable management options and, of course, their definition, cannot be done without conducting an in-depth assessment using a more thorough method to quantify the risks and distribution of impacts. Any management decision just based on the use of CHW must be avoided.</p>	<p>identification of the most critical regions for each hazard, it is not deemed sufficient in order to be used as a base for implementation. Risk mapping at steps 2 &amp; 3 is necessary. In addition to CHW, it would be recommended to refine/modify/adapt the CHW by including the effect of regional climate change in the hazard evaluation.</p> <p><b>Recommendation 5: ensure alignment between the CHW mapping and the SDLAO in order to ensure socio-economic aspects are taken into account</b></p> <p>The SDLAO (Schéma Directeur du Littoral d’Afrique de l’Ouest) identifies risks and integrates social and economic issues, whereas CHW takes into account only more geo-physical parameters. There is a need for WACOM to work with the scientific committee to clarify the SDLAO and how to streamline CHW and SDLAO (Schéma Directeur du Littoral d’Afrique de l’Ouest), assuring the integration of socio-economic aspect in to the CHW.</p>
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### 3. Illustration of the TA and photos

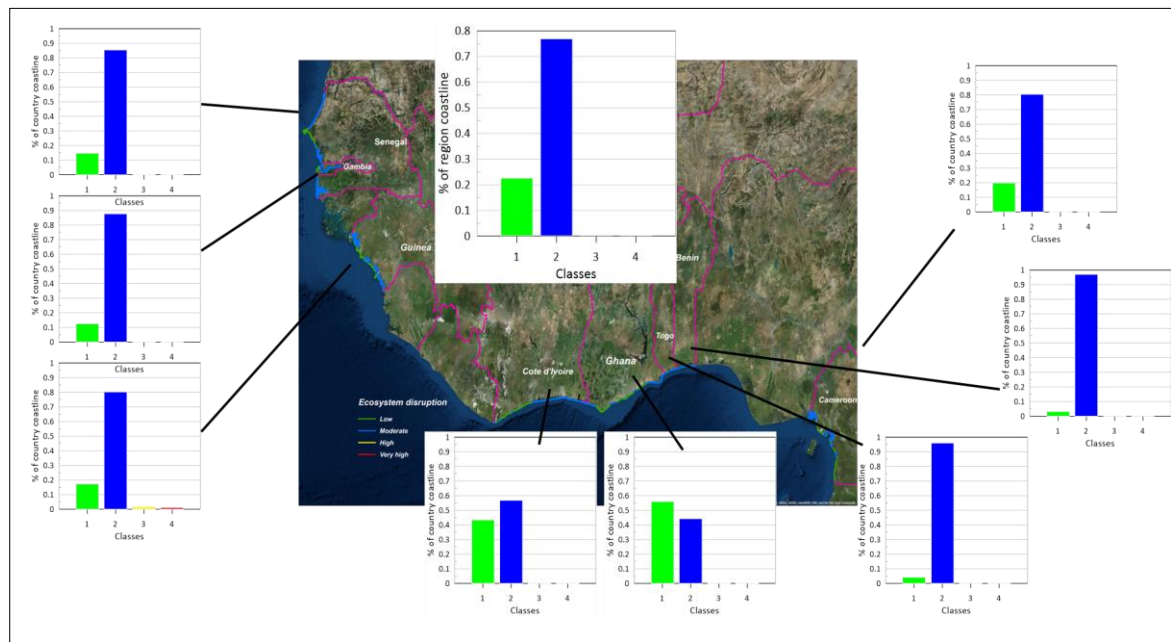
Power Point “20191220 TA\_closure report slides” attached.

Below are illustrations of the aggregated results of the mapping performed for 8 countries with the Coastal Hazard Wheel.

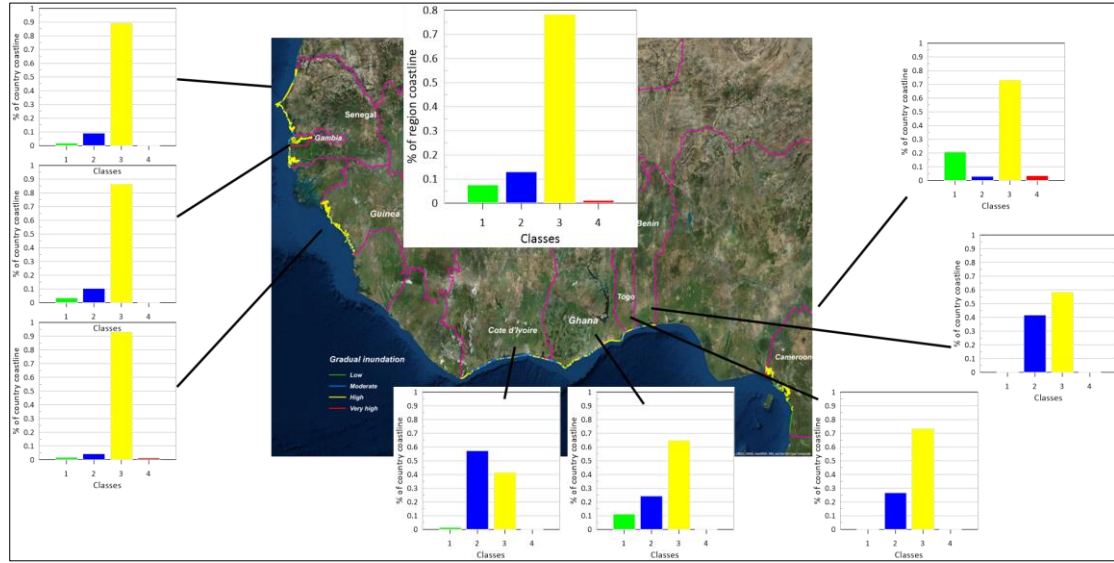
**Illustration 1: Coastal Hazard Wheel Mapping: overview Regional level of risk**



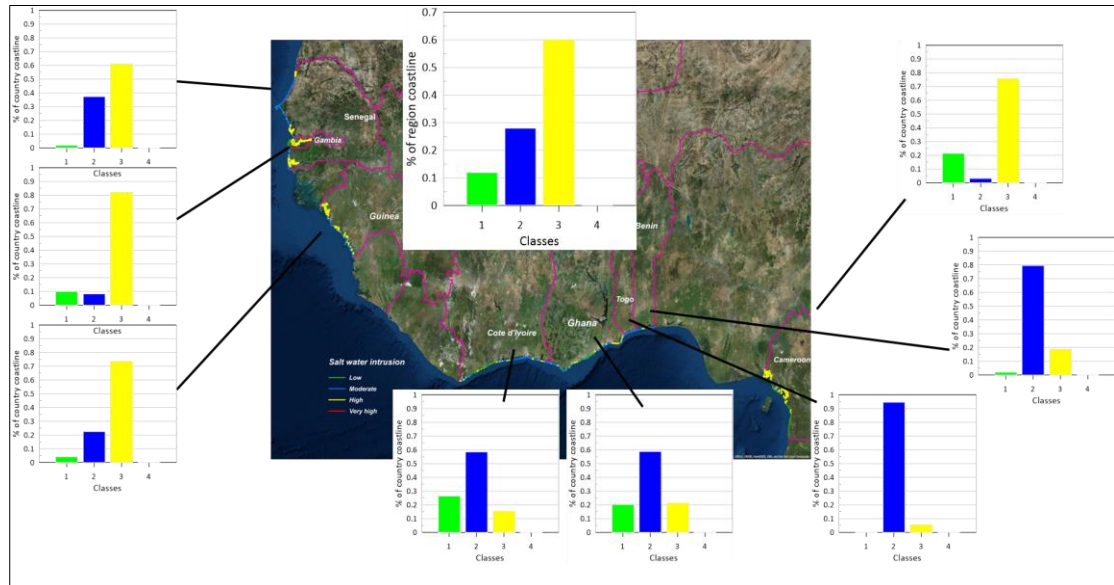
**Illustration 2: Ecosystem disruption at regional level**



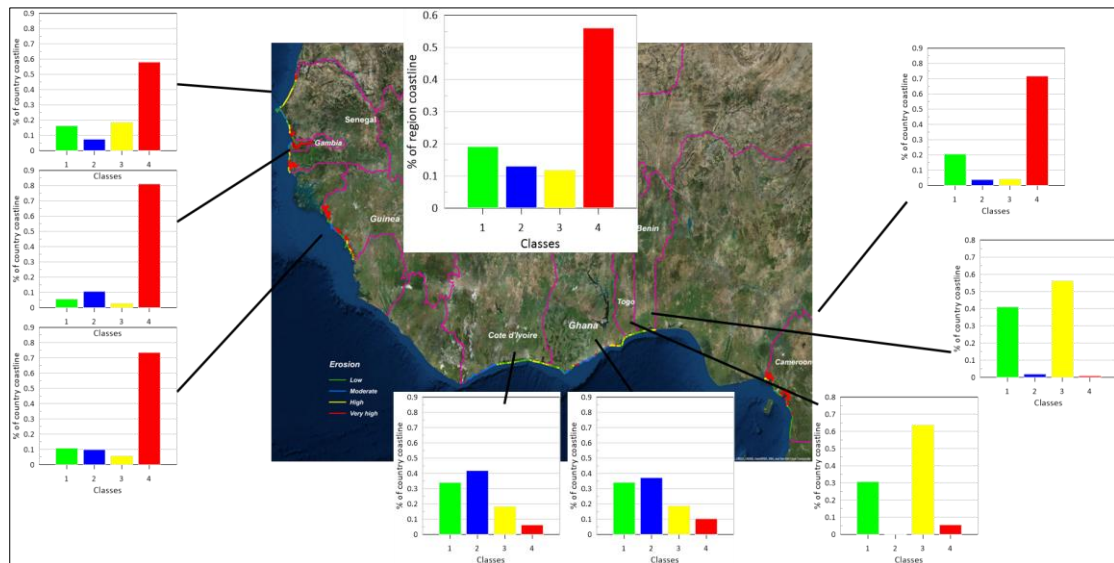
**Illustration 3: Gradual inundation at regional level**



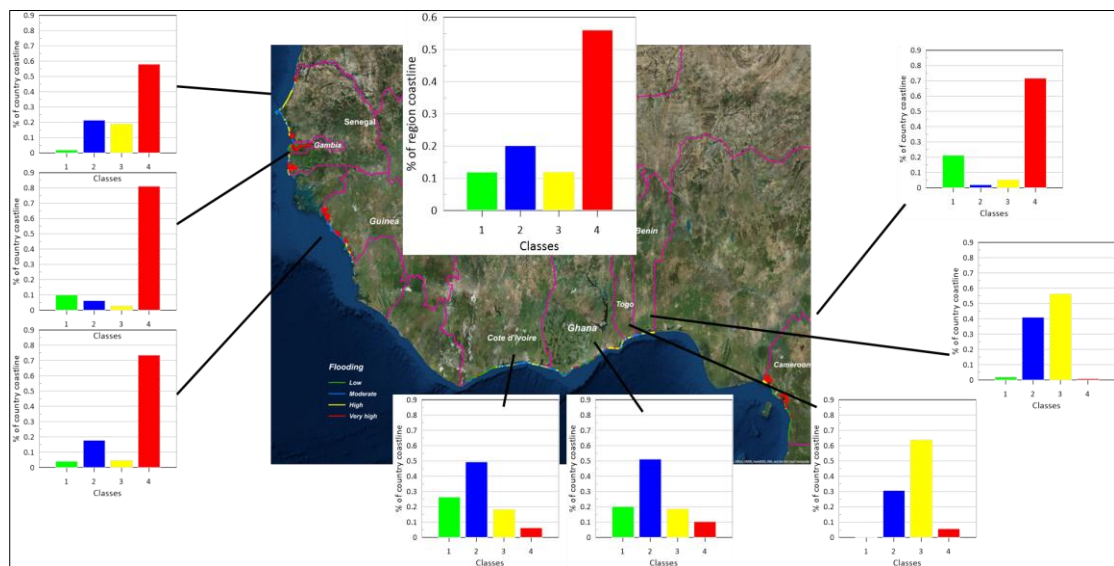
**Illustration 4: Saltwater intrusion at regional level**



**Illustration 5: Erosion at regional level**

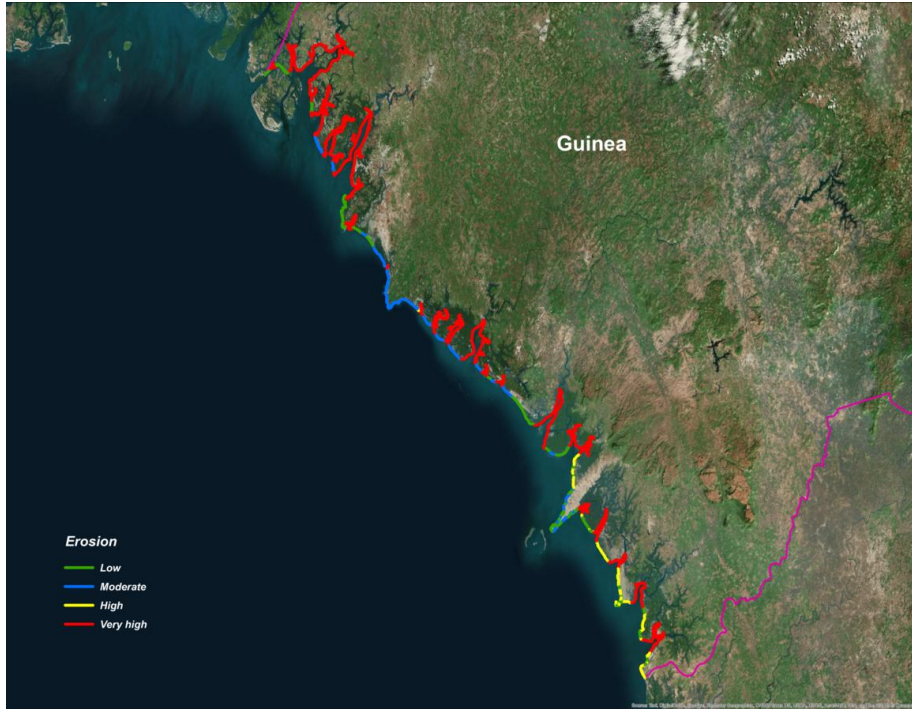


**Illustration 6: Flooding at regional level**

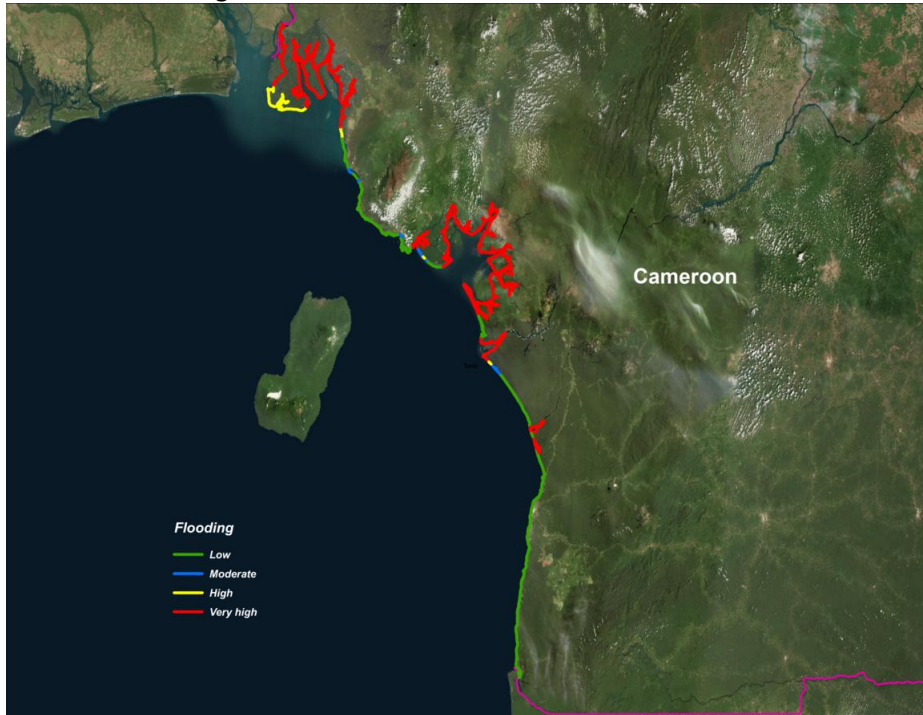


**High Resolution Photos provided**

Picture 1. Erosion risk in Guinea coastline



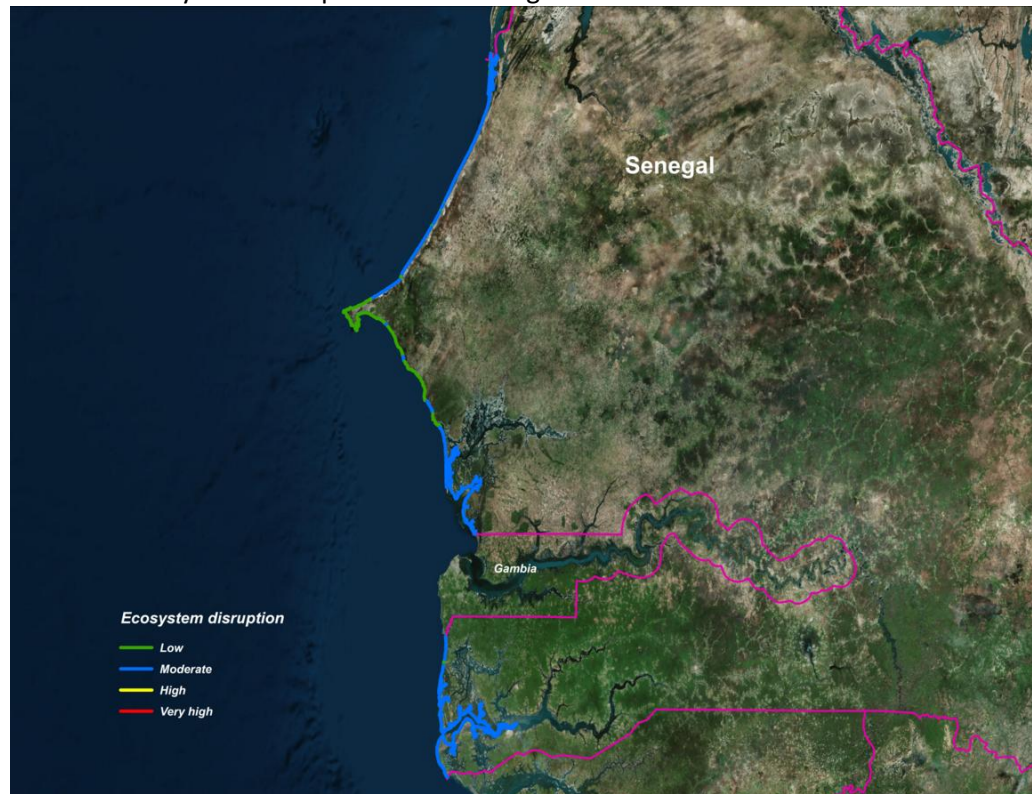
Picture 2. Flooding risk in Cameroon



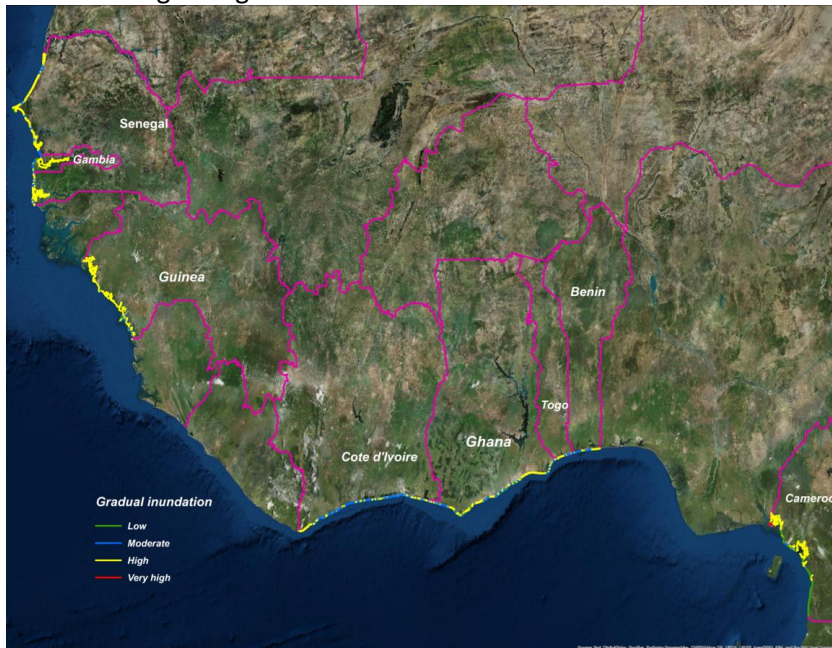
Picture 3. Saltwater intrusion risk in Gambia



Picture 4. Ecosystem Disruption risk in Senegal



Picture 5. Regional gradual inundation risk



Picture 6. Final Capitalisation Workshop in Dakar



#### 4. Impact Statement

<p><b>Challenge</b></p>	<p>The West African littoral, as well as Cameroon are among the most vulnerable regions of the world to the effects of climate change, coastal erosion and sea level rise, especially in a context of growing coastal urban concentrations and associated issues.</p> <p>Identifying climate-related risks on the West African and Cameroonian littorals is therefore crucial to manage potential risks. However, there is no harmonized method at the West African and Cameroonian littoral level to identify, characterize and manage coastal risks and plan the implementation of adaptation technologies. In this context WACOM and the National Designated Entities (NDEs) of the 9 countries (8 finally participated) request the assistance of the CTCN to strengthen their regional and national capacities to establish a robust diagnosis of multiple coastal risks and to identify technological adaptation options. The Coastal Hazard Wheel (CHW) was identified as the most relevant tool in the context of the West African and Cameroonian littoral.</p>
<p><b>CTCN Assistance</b></p>	<ul style="list-style-type: none"> <li>• Conduct a comprehensive assessment and analysis of data available at national and regional level and of their integration into the CHW system;</li> <li>• Organize a regional training session for WACOM's national antennas focal points and the regional coordination unit as well as the technical team of Cameroon on the methodology and the practical application of the CHW tool;</li> <li>• Train the experts of the national antennas and the regional coordination unit of WACOM and other relevant researchers on the data management available in the CHW system for the mapping of risks and adaptation options;</li> <li>• Produce the classification and mapping of coastal risks and adaptation options, using the Coastal Hazard Wheel method;</li> <li>• Identify, evaluate and formulate a series of recommendations for appropriate technological options to be implemented for the sustainable management of the main coastal risks;</li> <li>• Formulate recommendations for better optimization of the future application of the CHW tool in Cameroon, WACOM's and other regions.</li> </ul>
<p><b>Impact</b></p>	<ul style="list-style-type: none"> <li>• Strengthened capacity of more than one hundred and twenty (120) experts from national offices and researchers (15 experts per country for the 8 involved in the technical assistance) working in the field of coastal risk assessment and management and adaptation strategies;</li> <li>• Identification of eight (8) appropriate technological options that will be implemented in the context of the various ongoing and / or future projects and programs of WACOM and Cameroon;</li> <li>• The operationalization of a data collection and exchange system at national and regional level able to maintain national and regional databases and to feed the application CHW.</li> </ul>
<p><b>Co-benefits: Achieved or anticipated co-benefits from the TA</b></p>	<p>In the long term, the expected impacts of CTCN technical assistance are:</p> <ul style="list-style-type: none"> <li>• Developing and / or updating five (05) West African Coastal Master Plans and one (01) Cameroon Coastal Master Plan in the next 10 years using the information and data produced;</li> <li>• Developing and / or updating nine (09) national planning documents or coastal adaptation action plans in the next 10 years using the information and data produced;</li> </ul>

	<ul style="list-style-type: none"> <li>• Building the potential resilience capacity of at least 3 million people living in the coastal areas of the 9 countries involved in technical assistance.</li> </ul>
Gender aspects of the TA	<p>The TA included an evaluation study on the management of gender issues in coastal risk planning and management in West Africa and Cameroon. It explored the following key questions:</p> <ul style="list-style-type: none"> <li>• To what extent is vulnerability gender-specific in the West African and Cameroonian coastal area?</li> <li>• How does WACOM countries and Cameroon perceive and deal with vulnerability and resilience to coastal risks, taking into account gender?</li> <li>• How do WACOM countries and Cameroon intend to change the gender roles in coastal risk planning and management?</li> <li>• How do WACOM countries and Cameroon measure changes in gender roles in coastal risk management?</li> <li>• What are the factors that encourage changes in gender roles (drivers of change) and what are the limitations and challenges?</li> </ul> <p>The following main conclusions were drawn from the analysis:</p> <ul style="list-style-type: none"> <li>• In West African countries and Cameroon, coastal risks and disasters affect men and women differently.</li> <li>• International guidance has a certain influence on the uptake of gender mainstreaming in national policies.</li> <li>• Nevertheless, concrete implementation on the ground is still in an infant stage.</li> <li>• A specific approach for gender mainstreaming in coastal risk management is still missing.</li> <li>• Likewise, there is a lack of data and information on how gender roles change in coastal risk management.</li> </ul> <p>For these reasons, the following recommendations are given to ensure an effective mainstreaming of gender into coastal risk management:</p> <ul style="list-style-type: none"> <li>• Recommendation 1: Address knowledge gaps</li> <li>• Recommendation 2: Assign a specific gender focal point for coastal risk management</li> <li>• Recommendation 3: Encourage exchange of experiences at the regional level and take advantage of existing knowledge in the region</li> <li>• Recommendation 4: Promote the development of specific action plans on coastal risk management and gender</li> <li>• Recommendation 5: Ensure proper allocation of resources to data gathering for vulnerability assessments and gender analysis, as well as for M&amp;E activities</li> <li>• Recommendation 6: Tap into existing international financing mechanisms (e.g. GEF, GCF) that require gender-responsive approaches</li> <li>• Recommendation 7: Include reporting on gender mainstreaming into the national communications to the UNFCCC</li> </ul>
Anticipated contribution to NDC	<ul style="list-style-type: none"> <li>• Contribution to updating and / or elaboration of eight (08) national plans of adaptation actions of the coastal zones;</li> <li>• The implementation of 08 adaptation technologies appropriate to the priority coastal risks</li> <li>• Continuous updating of the regional and national databases</li> <li>• Strengthening the resilience capacity of at least 3,000,000 people living in</li> </ul>

	<p>coastal areas of West Africa and Cameroon as a result of improved planning and integrated management and implementation of appropriate technological adaptation measures and options</p>
<p>The narrative story</p>	<p><i>1. Background and context</i></p> <p>The West African littoral (10,000 km long at the 100,000th scale and 25 km wide, from Mauritania to Benin), as well as Cameroon (402 km long<sup>4</sup> and 60 km wide<sup>5</sup>), are increasingly sought after because of their great ecological and socio-economic potential (UEMOA &amp; IUCN, 2016)<sup>6</sup>. These coastlines host a plurality of economic activities, particularly fishing, coastal tourism, shipping, extraction of mineral resources and other renewable and non-renewable resources, oil, gas, etc. For example, the annual volume of legal fishing in West African waters exceeds 1.6 million tonnes, with a commercial value of 2.5 billion USD (World Bank, 2016)<sup>7</sup>.</p> <p>This coastline would now concentrate about 30% of the total population and more than 50% of the urban population as well as 56% of the total Gross Domestic Product (GDP) of the coastal countries, i.e. 21% of the rural GDP and 76% of the GDP urban area (WAEMU, 2010)<sup>8</sup>. The increase of its urban population is expected to quadruple between 2000 and 2050 with respectively 18 and 83 million inhabitants (SDLAO, prospective study 2011). The average density of the population would thus rise from 260 to 500 inhabitants per km<sup>2</sup>, with considerable disparities depending on the country (SDLAO, prospective study 2011).</p> <p>However, this strong littoralization of human settlements, urban population and economic activities generates multifaceted pressures on resources, acute tensions between users, the degradation of ecosystems and marine resources and the vulnerability of the West African and Cameroonian coastal zones. This vulnerability is strongly amplified by the cumulative effects and impacts of climate changes that already affect many countries (UEMOA &amp; IUCN, 2016, UEMOA, 2010).</p> <p>The studies carried out on climate forecasting in West Africa show several uncertainties concerning the evolution of precipitations, the frequency of extreme events (episodes of intense precipitation, depressions and tropical storms, significant height of waves ...) (Weisse and al., 2010)<sup>9</sup>, sea level rise and storm surges. A rise in sea level of 3 mm/yr would result in exceptional marine surges (Obeysekera et al., 2012)<sup>10</sup>, ranging from 0.5 to 2 m by 2100 (Williams et al., 2013)<sup>11</sup>.</p> <p>Cameroon experienced a sea level rise rate of 1.8 to 2.2 mm / year between 1948 and 2003 (Fonteh et al., 2009)<sup>12</sup>. The projections show a rise in sea level of</p>

4 Sayer A., Harcourt, S., Collins., 1992. The conservation atlas of tropical forest Africa. IUCN, Macmillan Publishers Ltd, London: 13-130

5 Ngongan Meppa E. 2012. Evaluation des impacts des activités pétrolières sur les écosystèmes de mangroves et les habitats côtiers. 16ème Colloque International en Evaluation Environnementale, Présentation Power Point, 25 p.

6 UEMOA & IUCN. 2016. Bilan 2016 des littoraux d’Afrique de l’Ouest, Document général, 75 p.

7 Banque Mondiale. 2016. Gérer les risques côtiers en Afrique de l’Ouest. Programme WACA, Fiche de connaissances n° 3, 2 p.

8 UEMOA. 2010. Etude de suivi du trait de côte et Schéma directeur du littoral de l’Afrique de l’Ouest : Synthèse diagnostic régional, 140 p.

9 Weisse, R. and von Storch, H., 2010. Marine Climate Change : Ocean Waves, Storms and Surges in the Perspective of Climate Change.

10 Obeysekera, J., Park J. 2012. Scenario-Based Projection of Extreme Sea Levels. 29 (1), p. 1-7.

11 Williams S.J. 2013. Sea-Level Rise Implications for Coastal Regions. . 63 (sp.1), p.184-196.

12 Fonteh M, Esteves L.S. and Gehrels W.R. 2009. Mapping and evaluation of ecosystems and economic activities along the coast of Cameroon; implication of future sea level rise. EUCC- Die Küsten Union Deutschland International approaches of coastal research in theory and practice. Coastline reports, 13:47-63).

between 9 and 38 cm in 2050 (Fonteh et al., 2009), to reach 86 cm in 2100 (GIZ, 2003)<sup>13</sup>. These projections would have the potential consequences of flooding 38 villages out of 72 in coastal agro-ecological zone, the demolition of fishermen's dwellings, the migration of about 5900 fishermen and their families (MINEF, 2005)<sup>14</sup> and the loss of 33 000 ha of mangroves (representing 30% of the total area of mangrove forests in Cameroon) (PANA, 2015)<sup>15</sup>.

In this context of climatic uncertainties, the erosion and flooding phenomena of the coastal zones, which contribute strongly to the withdrawal of the coastline, will be aggravated during the 21st century, following the increase of the average sea level (UEMOA, 2010). Africa is one of the world's regions whose coastal areas and deltas are most at risk from flooding due to rising mean sea level (Nicholls and Tol, 2006, in UEMOA, 2010).

This rise in sea level, combined with the increase in intensity or frequency of extreme events, could have serious consequences for the development of coastal areas (flooding, worsening of erosive phenomena, loss of land, progression of the seawater and alteration of freshwater lenses and their impacts on agriculture and consumption...).

Many coastal or island areas will be submerged, or prone to more and more frequent floods, resulting in considerable damage and loss (UEMOA, 2010). Floods would affect about 500,000 people each year in West Africa (World Bank, 2012) . In Cameroon, nearly 30,000 people were affected by the floods in 2012 (OCHA, 2012) .

To meet these challenges and major challenges, the West African Economic and Monetary Union (UEMOA) in 2009 under the Regional Program for the Control of Coastal Erosion (PRLEC - UEMOA), initiated a regional study of coastline monitoring and development of a Master Plan of the West African Littoral, subject of the Regulation 02/2007 / CM / UEMOA, adopted on April 6, 2007. This decision was also in response to the recommendations of the Conference of Ministers in charge of the Environment dated April 11, 1997, in Cotonou, which had approved the PRLEC - UEMOA.

This study conducted by IUCN through its Marine and Coastal Program for Central and West Africa has made it possible to draw up a regional diagnostic assessment and a West African Coastal Master Plan, validated during the Conference of Ministers of the 11 countries involved in May 2011 in Dakar (Senegal).

One of the main resolutions of this conference to respond to the growing need for strong regional cooperation and integration, was the setting up of a West African Coastal Observation Mission - WACOM (UEMOA & IUCN, 2016). Thus, created in 2012, WACOM is therefore a necessary and relevant regional response to the challenges of setting up a shared hub of capacities, knowledge and know-how allowing the West African states to address the challenges of sustainable development of coastal zones and their preservation, in a context marked by global climate change and increasing social and economic issues (MOLOA / UEMOA & IUCN, 2016). WACOM updated the Diagnosis Report and the West African Coastal Master Plan in 2016; however, these documents are not yet validated.

In addition, one of the key lessons learned from these experiences of UEMOA /

<sup>13</sup> GIZ.2013. Rapport d'étude sur le changement climatique, la dynamique démographique et la santé de reproduction dans les régions du Sud-Ouest et de l'Extrême Nord du Cameroun. Yaoundé, 236 p..

<sup>14</sup> MINEF (CMEF). 2005: Communication initiale sur les changements climatiques au Cameroun. Yaoundé, 160 p

<sup>15</sup> Rép. du Cameroun /MEPNDD. 2015. Plan national d'adaptation au changement climatique du Cameroun, 154 p.

	<p>IUCN and WACOM, is the need to maintain, from a network of experts, an effective scientific watch (production and sharing of information from a network of experts) and to organize the dissemination of new elements within the WACOM regional network (MOLOA / UEMOA &amp; IUCN, 2016).</p> <p><b>2. Problem statement</b></p> <p>One of the main findings of the regional study is the recognition of the importance of risks to coastal urban concentrations and associated issues (human, economic and industrial) in the changing climate of climate change (MOLOA / UEMOA &amp; IUCN, 2016). The trends identified in the horizons of 2020 and 2050 highlight the rapid growth of these coastal issues (population growth, coastalization of societies, economic development and associated infrastructures). In this situation, the ability to anticipate and strategically consider the development of coastal territories becomes vital (MOLOA / UEMOA &amp; IUCN, 2016).</p> <p>Coastal risk reduction, mobilizing all sectors and actors involved on the coast, requires the provision of reliable and up-to-date information, shared and made available at the various decision-making levels with a view to improving the strategic quality of decisions related to the development, occupation and conservation of coastal areas (MOLOA / UEMOA &amp; IUCN, 2016). Thus, identifying climate-related risks on the West African and Cameroonian littorals is therefore crucial and essential to manage potential risks in a timely manner, which is particularly difficult in developing countries where data, expertise and economic resources are limited, combined with extremely rapid population growth.</p> <p>Different methodologies and approaches are developed to assess coastal risks and manage vulnerability to climate change in the littoral zone (Appelquist et al., 2014)<sup>16</sup>. On the one hand, methods based on indices and indicators (e.g. Coastal Vulnerability Index - CVI) are to date the most realistic options for data-poor regions such as developing countries, but they cannot be used directly to identify risks and specific management options and require relatively detailed input data (Ramieri et al., 2011; Thieler et al., 2000; Sharples, 2014, in Appelquist et al., 2014).</p> <p>On the other hand, methods based on decision support systems (GIS and dynamic computer models), developed for different purposes and with different requirements for data and expertise, are very complex and should be associated with larger or higher resolution data collection programs (Ramieri et al., 2011, in Appelquist et al., 2014).</p> <p>The diversity of methodologies and risk assessment approaches applied in the 9 countries raises the issue of harmonization of data collection, processing, quality, reliability, comparability and data sharing. and their relevance in decision-making processes for coastal planning and governance.</p> <p>Indeed, there is no harmonized or standardized method at the West African and Cameroonian littoral level to identify, characterize and manage coastal risks and plan the implementation of specific adaptation technologies. It is in this context that WACOM and the National Designated Entities (NDEs) of the 9 countries request the assistance of the CTCN to strengthen their monitoring and planning system, assess the coastal risks through a standardized multi-risk approach and identify the technological adaptation options most appropriate to their respective</p>
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<sup>16</sup> Appelquist, L. R., & Balstrøm, T. 2014. Application of the Coastal Hazard Wheel methodology for coastal multi-hazard assessment and management in the state of Djibouti. *Climate Risk Management*, 3, 79-95. DOI: 10.1016/j.crm.2014.06.002

	<p>contexts.</p> <p>Specifically, WACOM and the NDEs wish to strengthen their regional and national capacities to establish a robust diagnosis of multiple coastal risks and to identify technological adaptation options. As such, they have identified the Coastal Hazard Wheel (CHW) as a universal system of coastal risk classification and assessment and a relevant tool in the context of the West African and Cameroonian littoral, which will complement the other tools currently in use.</p> <p>The originality and added value of CHW lies in its analytical framework which makes it possible to fill the gaps of current methodologies while offering a tool capable of combining both the evaluation and the sustainable management of the main coastal risks in different geographical contexts characterized by limited data, resources and institutional capacity, such as the coastal areas of West Africa (Appelquist et al., 2014) and Cameroon.</p> <p>The methodology aims to bridge the gap between science and planning (policies) by providing an analytical grid and a standardized classification for the typology of risks and the identification of specific adaptation options. CHW's analytical framework is specifically designed to facilitate risk assessment and identification of risk areas at regional and national level, but it can also be used as a front-line tool for risk identification at the national level, prior to conducting more detailed feasibility studies (Appelquist et al., 2016)<sup>17</sup>.</p> <p>The CHW is specifically designed to assist in decision-making based on biological, geological and physical parameters that determine the nature of the coastal environment, according to precision requirements in the field (Appelquist et al., 2014).</p> <p>These parameters include geographic configuration, wave exposure, tidal range, flora and fauna, sediment balance, and storm regime (UNEP, 2016)<sup>18</sup>. It helps to classify a given coastal site, determine its risk profile and potential management options and disseminate coastal information through a harmonized common language (UNEP, 2016; Appelquist et al., 2016).</p> <p>The CHW examines the risks associated with ecosystem disruption, flooding, including gradual flooding, saltwater intrusion and erosion (UNEP, 2016, Appelquist et al., 2016). It comprises a total of 655 individual risk assessment tools and a comprehensive risk profile for 131 coastal environments (UNEP, 2016, Appelquist et al., 2016).</p> <p>Until the present T.A., CHW had been applied in countries such as Colombia, Vietnam, Bangladesh, Djibouti, India and Malta (Appelquist et al., 2016, Appelquist et al., 2014). The technical assistance aimed to expand the use of the tool in the typology of coastal systems in West Africa and Cameroon.</p>
<p>Contribution to SDGs</p> <p>A complete list of SDGs and their targets is available</p>	<p><b>SDG 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation</b></p> <p>Coastal infrastructure development is threatened by various coastal hazards, including coastal erosion and floods, which often result in considerable loss and damage. In this regard, CTCN assistance contributed to a better assessment of</p>

<sup>17</sup> Appelquist, L. R., Balstrøm, T & Kirsten Halsnæs. 2016. Managing climate change hazards in coastal areas: The Coastal Hazard Wheel Decision-support system. Quick Start Guide, 20 p.

<sup>18</sup> UNEP, 2016. Gestion des risques liés au changement climatique dans les zones côtières : Le système d'aide à la décision Coastal Hazard Wheel, Résumé analytique, 4 p.

<p>here:  <a href="https://sustainabledevelopment.un.org/partnership/register/">https://sustainabledevelopment.un.org/partnership/register/</a></p>	<p>coastal risks and appropriate technological options to protect and secure industrial, port and other infrastructures and thus strengthen their resilience.</p> <p><b>SDG 13. Take urgent action to combat climate change and its impacts</b></p> <p><b>13.1 - Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries</b></p> <p>The purpose of the CTCN assistance was to strengthen the technical capacity of WACOM national and regional experts to increase resilience and adaptation capacities to coastal climate risks such as coastal erosion, floods, disruption ecosystems and the sea water intrusion</p> <p><b>13.2 - Integrate climate change measures into national policies, strategies and planning</b></p> <p>CTCN assistance enabled the establishment and management of harmonized national and regional databases within WACOM and identifying appropriate adaptation technologies that will be integrated into national and regional coastal policies, strategies and planning.</p> <p><b>13.3 - Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning</b></p> <p>Practical training for national and regional experts strengthened their technical capacity and the institutional capacity of WACOM and its branches. The results obtained in the context of the CTCN assistance and presented in the form of statistics and risk maps and technological options will serve as tools for raising the awareness of public authorities, local authorities and other bodies on management issues sustainable coastal risks.</p> <p><b>13.b - Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities</b></p> <p>The development and extension to all West African coastal developing countries provide reliable data to support coastal planning decision-making processes, the impacts of which could benefit local communities and particularly the local communities, women and young people</p> <p><b>14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development</b></p> <p>The national and regional databases developed in the framework of the CTCN Assistance and updated on a continuous basis will enable the development of relevant policies, strategies, projects and programs for the sustainable management of oceans, seas and marine resources. and coastal areas that can reconcile socio-economic development concerns with conservation imperatives</p>
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