# Explanatory Note of Vulnerability Mapping for Natural Disasters in the Municipalities of Quelimane and Pemba

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# 1. INTRODUCTION

Climate change affects millions worldwide and poses significant global challenges. (IPCC, 2013). In Mozambique, the effects of climate change are particularly evident, most notably in coastal cities, where environmental changes are becoming more pronounced. Erosion, flooding, and ecosystem degradation are often reported in most of the coastal cities and villages in Mozambique (INGC, 2009). To successfully implement adaptation and preparedness measures, vulnerability mapping is needed to identify areas with different risk levels to climate-related events and to other natural disasters. This information can then be used by cities to develop their detailed plans and prioritize adaptation activities for the most vulnerable areas, taking into consideration the intensity of extreme weather events in the coming years.

This document provides a description of how the vulnerability maps for Quelimane and Pemba municipalities were produced. During the mapping process, CCAP assessed the communities' vulnerability to climate change and other environmental hazards, assuming the climate-induced impacts on these cities occur in conjunction with other natural hazards. Therefore, this work focuses on the vulnerability mapping for natural disasters and extreme weather events regardless of their relation to climate change. With this in mind, we intend to cover the environmental changes taking place in the landscape with their impact on the people's lives and on the sustainability of the cities. Therefore we aggregated the natural, social, and economic variables operating in each city. The vulnerability map will be accompanied by three other maps: (i) Exposure, (ii) Sensitivity and (iii) Adaptation Capacity as defined by IPCC (Lavell et al., 2012).

# 2. METHODOLOGY

In mapping vulnerability, the first step to consider is the conceptualization of the process. The complexity of the mapping process calls for an interactive and holistic approach (Kienberger, 2012) and demands a multi-disciplinary analysis. As often discussed, the Geographic Information System (GIS) is the ideal platform to aggregate and process complex data provided by different experts and is available in various formats. The most important step in the process however is the structuring of the ideas to produce the most realistic maps.

## 2.1 CONCEPTUALIZATION

Delineating and planning what to include in the mapping process was an important first step given the multitude of understandings and preferences on how mapping is best conducted. The discussion started with the adoption of the Intergovernmental Panel on Climate Change (IPCC) vulnerability concept, focusing broadly on natural disasters and how it applies to the context in

Pemba and Quelimane. Therefore, the technical team addressed the intended exercise as a way of developing maps highlighting areas (within the municipality boundaries) falling within the spatial distribution of the probabilities of climate related and other natural disasters to impact in the city. While the definition of vulnerability varies from situation to situation, for the purpose of this mapping exercise, vulnerability has been defined as it relates to extreme climate events in each city. Hence, up to 30 natural and socio-economic parameters were defined as part of the mapping process. Such parameters were then be converted to multiple maps, weighted according to the average score calculated from the contributions from the CCAP experts. The detailed variables are listed in Table 1 and Table 2 in the Appendix.

## 2.2 COMMUNITY PARTICIPATION

One of the crucial processes for vulnerability mapping is to explore the perceptions from those in the communities impacted by natural disasters. Receiving input from these communities is crucial given that it is the communities, themselves, who validate the final maps. To compile the required community-level input, the project organized meetings in each municipality, bringing together local leaders, NGO representatives, technicians, religious leaders, and other influential stakeholders. In the meetings, the participants shared their experiences dealing with natural disasters in order to contribute to the creation of vulnerability concepts to guide the mapping process. Through this discussion, the team was able to break down the vulnerability concepts into 30 parameters, applying participant experiences and perspectives to rank them according to their perceived relevance.

**Figure 1: Photo showing a community meeting session held in Quelimane Municipality.**

The lists of the variables discussed and identified in this meeting are listed in Table 3 and Table 4 for both municipalities. One of the notable observations of this exercise is that different tables identified different parameters and scores for their municipalities, thereby highlighting the contrasting realities of each location according to their environmental characteristics.

## 2.3 DATA COLLECTION

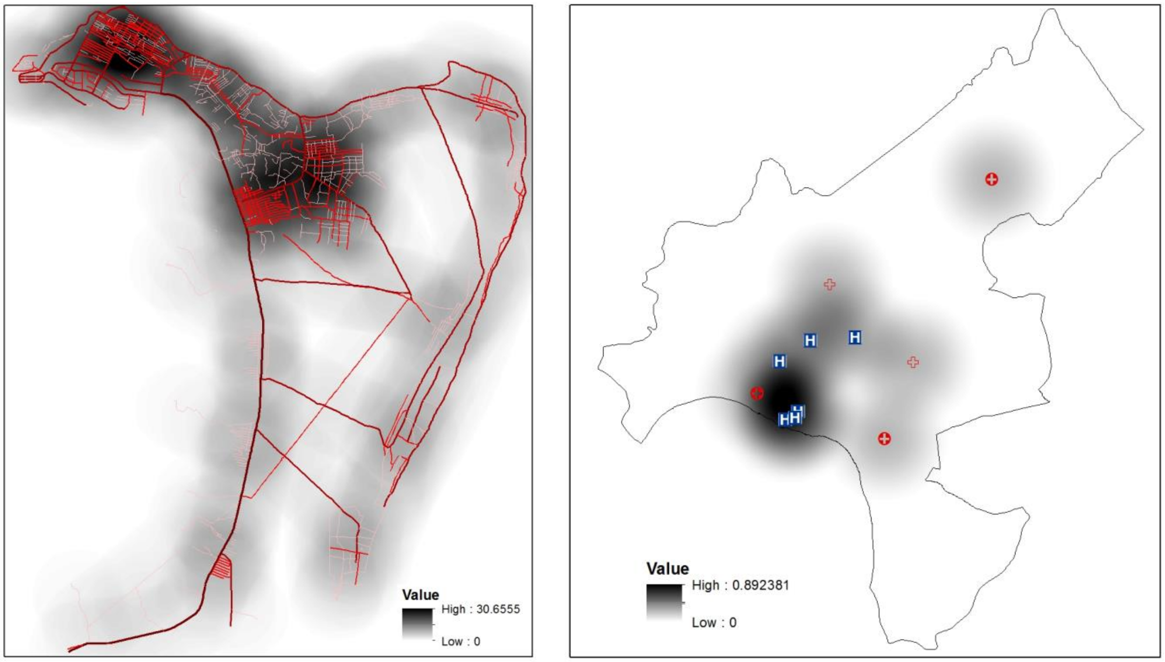
From the list of approximately 30 variables discussed in the conceptualization phase, a maximum of 12 were had the established sufficient data sets that could be used for mapping. The data collection consisted of searching the available database for the Municipality scale. Topographic maps, at a scale of 1:5000, were purchased for each municipality in CENACARTA (National Center of Cartography and Remote Sensing). Another land use and topographic dataset (from the Millennium Challenge Account – MCA project) was provided by the municipalities' technicians. The topographic maps had coverage of approximately 90% of the municipality area of Quelimane and 30% of the municipality area of Pemba. CCAP used the Shuttle Radar Topographic Mission (SRTM) data to fill the gaps of in the information from CENACARTA. The Normalized Difference Vegetation Index (NDVI) was calculated from Spot image and Landsat image for Quelimane and Pemba, respectively.

## 2.4 DATA PROCESSING

In mapping processes that demand the use of complex data, the organization and standardization of the data is essential. It is equally important to keep the track of the data and allow the flexibility of exploring the data at the final stage. To arrive at the final stage – that is, the development of the maps themselves – we used a rasterization process and raster value extraction process, explained below.

### 2.4.1 RASTERIZATION

All acquired data were processed in the same format that could be used as a starting point for standardizing the parameters to be used in the mapping process. Most of the data was primarily acquired as vector data in points and lines. Roads, hospitals, schools and land use – which contribute to the adaptation index for vulnerability – are examples of the vector data exported to raster. To map the proximity of each location, schools (points) and roads (lines) were applied using the density tool in ArcGIS. With this tool, ArcGIS calculates continuous fields by searching for a number of points per square kilometer in a defined radius. The same is applied to the length of vectors per square kilometer within a certain radius. The raster images were processed to a spatial resolution of 10 meters.




**A** **B**

**Figure 2: Maps showing in gray scale the continuous fields generated by vectors for Pemba (A) and Quelimane (B). The generated fields are overlain by the attributes that produced the respective fields. Darker areas represent density of social infrastructure.**

The 1:5000 scale topographic vector data was interpolated to a continuous surface showing the elevation above the mean sea-level. As mentioned above, the Shuttle Radar topographic Mission (SRTM) topographic data was employed to cover the area that was missing the higher resolution topographic data. For the municipality of Pemba, we used the digital elevation surface to generate slope that was integrated into the vulnerability mapping as a parameter indicating the soil's susceptibility to erosion.

### 2.4.2 RASTER VALUE EXTRACTION

The raster data's attributes were extracted and registered in a table for further statistical operations and exportation to other formats to generate the maps. For this procedure, we first created a polygon fishnet with 10x10 m cell size covering a rectangular working space area of the municipality. We allowed the creation of the labels (points) in the center of each 10x10m polygon (Figure 3). Both polygons and the points had the same location reference and Object ID, an important condition for further operations in the mapping process.

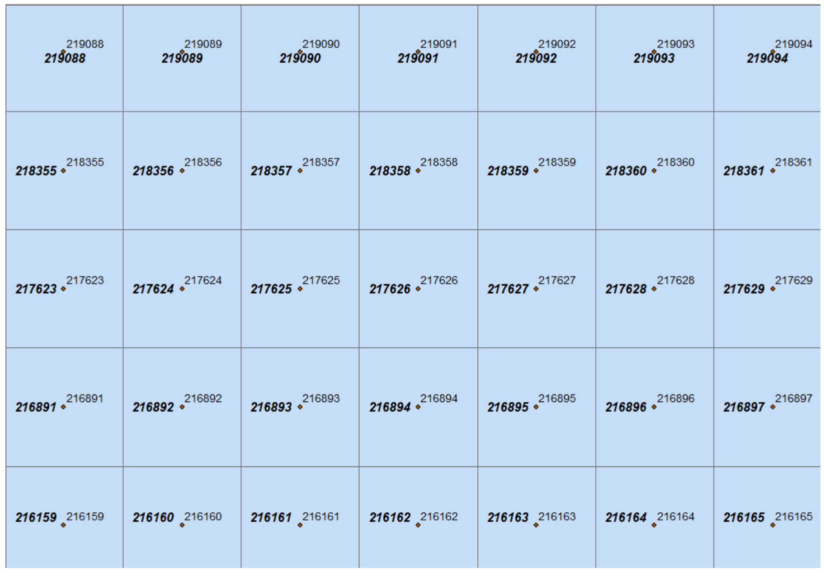



**Figure 3. Example of the polygon centroids with the respective labels (points) in the center of each cell. The numbers within each centroid are the Object ID of the centroids.**

The polygon centroids falling within the municipality area were selected and exported to another shapefile. We selected the corresponding points (labels) and exported them to another shapefile. With this done, the exported centroids are comparable to 10 m blank pixels covering precisely the municipality area. Any attribute added to the polygon shapefile could also be visualized in colors. From this point, we prepared 12 fields that could accommodate the values to be extracted from the raster map. Therefore, using the Extract Values to Point tool, we extracted the raster values from each raster map using the label centroid shapefile. The tables' comparability allowed the combination of the tables and calculation of the parameter values extracted from the maps.

At this stage all the data could be represented in one column for each parameter and also visualized using the options available in the software. The map drawn in this procedure is comparable to a raster map, but differs in its easier management of the data exploring the raster values. The values can be processed and related among the different parameters. The values from each parameter were standardized to a percentage scale to make possible the comparability of the variables. From this step, all the parameters were calculated into new columns to generate new values that could reflect newer maps. With this procedure we generated newer maps using a simple arithmetical operation among the data.

# 3. RESULTS

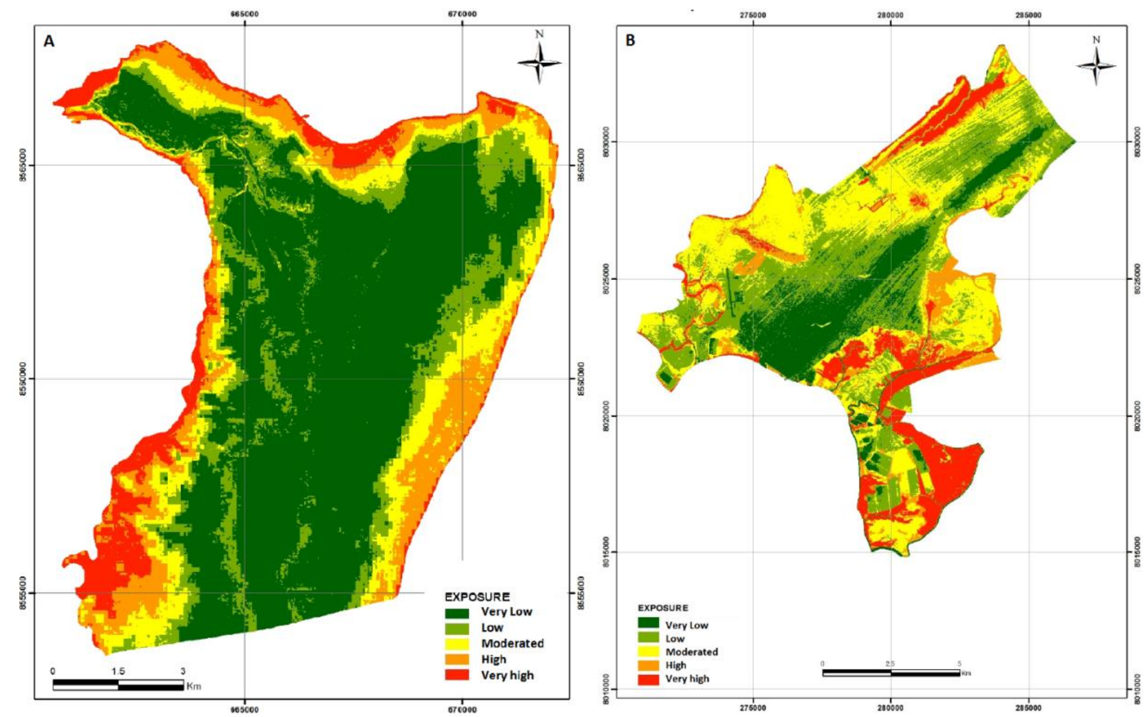
The main output of this work is the vulnerability map, which is a result of a combination of three other maps calculated separately using the indexes: (i) Exposure; (ii) Sensitivity and (iii) Adaptation Capacity. Additional maps showing scenarios of sea-level rise for both municipalities, risk of erosion (for Pemba) and the high-risk areas for cyclones (for Quelimene) were estimated. The maps are saved in layers and JPEG files displaying five classes. The digital version of the maps still preserves the quantitative data which can be updated or combined with other variables.

## 3.1 EXPOSURE

In this mapping process, the Exposure index aggregates the Topography, Slope, NDVI, and Mangrove. Each parameter was weighted according to its relevance for each municipality. The topography parameter played a crucial role for both municipalities to map areas that are prone to the relative sea-level rise. The topography in Quelimane ranges from 3.66 to 8.14 m above the mean sea-level, whereas in Pemba the Topography ranges from 0.00 to 117.00 m above the mean sea-level. In reality, the height above 20 m may not contribute to the vulnerability in assessment. Therefore, the calibration of the height to topography in Pemba considered the range between 0.00 to 20 m to be recalculated within the percentage range and inverted to match the direction in which the topography contributes to the vulnerability. The Slope was not used for Quelimane given its minimal contribution to the ongoing environmental issues. On other hand, the geographical area of Quelimane is nearly flat, and the slope is virtually insignificant to contribute to the vulnerability. Hence the following formulas were applied:

Exposure(Quelimane) = 0.3* [NDVI]+0.4* [Topography]+0.3* [Mangrove] ;

Exposure(Pemba)=0.1* [NDVI]+0.4* [Slope]+0.4* [Topography]+0.1* [Mangrove]




A B

**Figure 4: Exposure maps from Pemba (A) and Quelimane (B) municipalities showing five qualitative classes (very low to very high).**

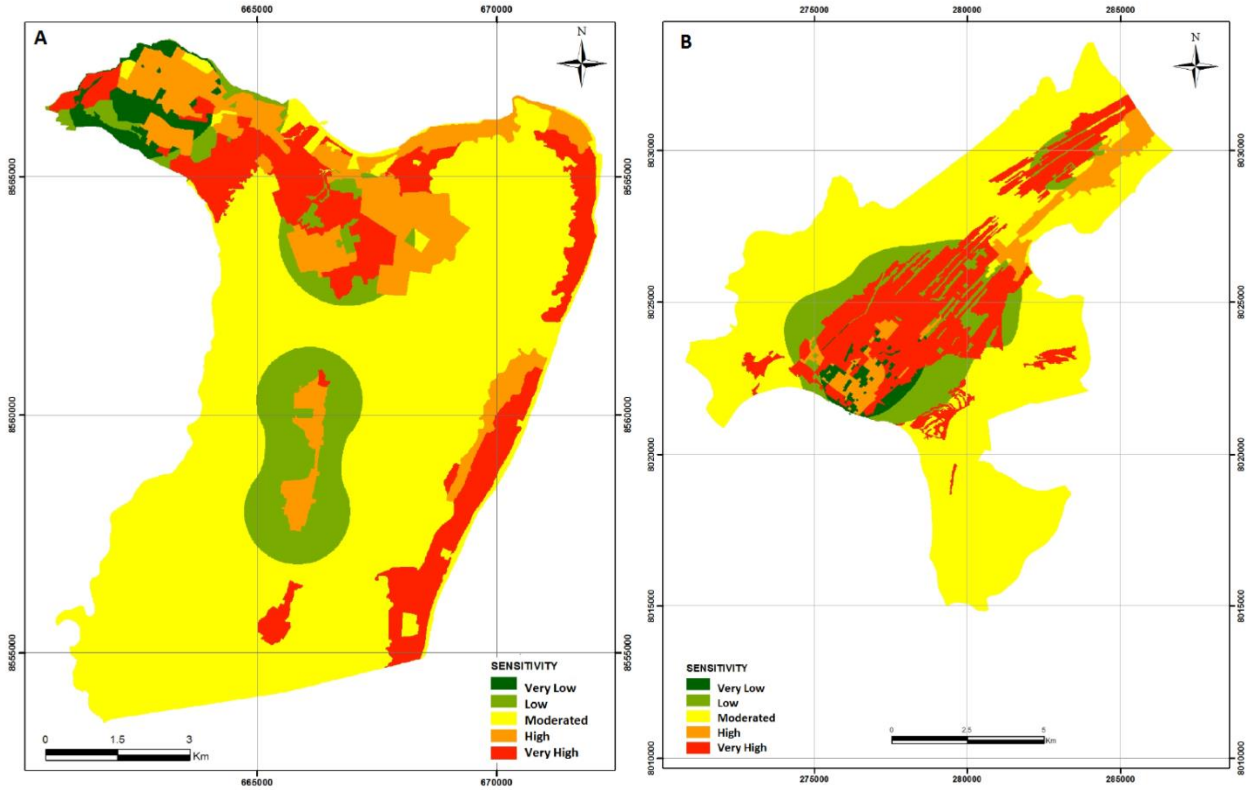
The Exposure maps show levels of exposure on color-coded scale, with red areas signifying a high levels of exposure, yellow areas signifying a moderate level of exposure, and green areas signifying a low level of exposure. In other words, the exposure map shows areas with highest probability of being affected negatively by climate-related events or other natural disasters.

## 3.2 SENSITIVITY

Sensitivity is a crucial index in vulnerability mapping. This index aggregates variables related to the fragility of the valuable environmental attributes which may be affected by climate-related events (IPCC, 2007; Lavell et al., 2012). In this mapping project, we assembled the following parameters: Population density, schools, house types, and the waste management. The following formulas were applied to calculate the total sensitivity.

Sensitivity(Quelimane) = 0.3 * [Pop_density] +0.15* [Escolas] +0.4 * [Tcasas]+0.15 *[Saneament]

Sensitivity(Pemba) = 0.3* [Pop_Densit]+0.15* [Escolas]+0.4* [Tipocasas]+0.15* [Saneamento].




**A** **B**

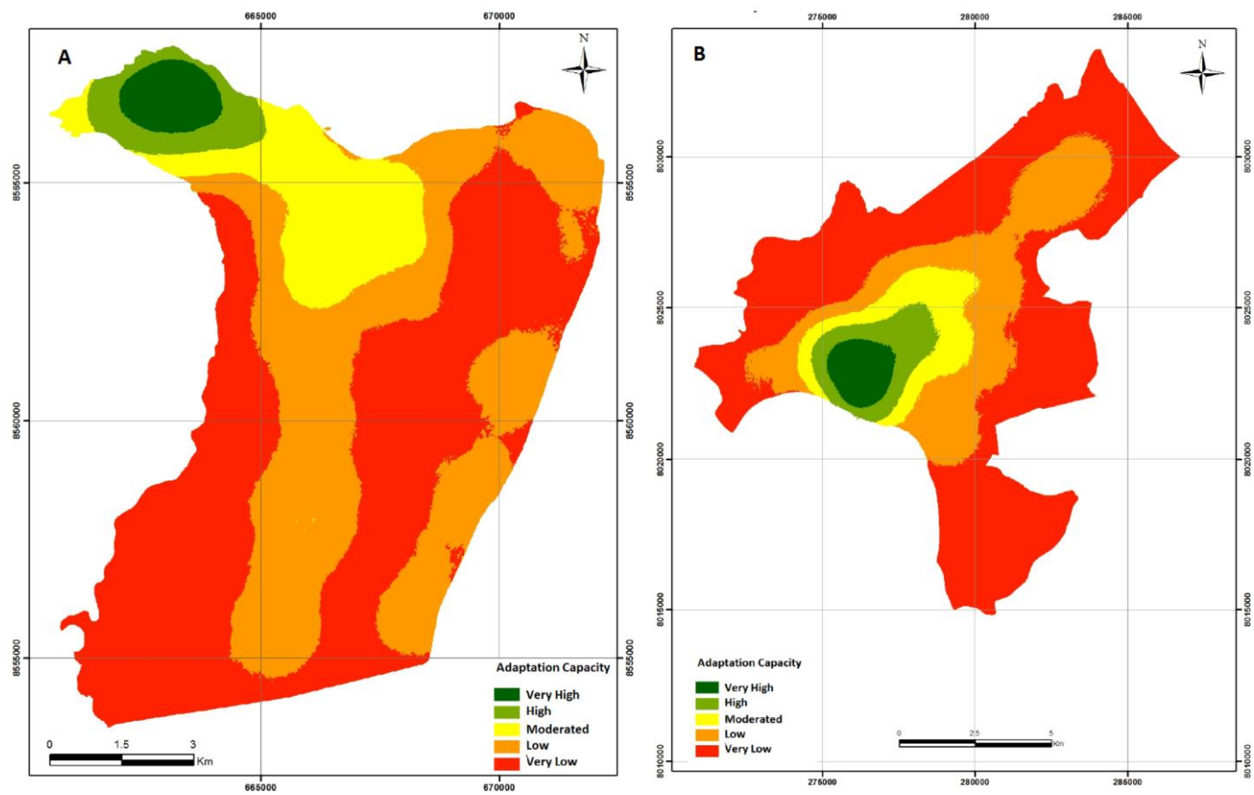
**Figure 5: Maps showing sensitivity for Pemba (A) and Quelimane (B) in five qualitative classes (very low to very high).**

## 3.3 ADAPTATION CAPACITY

This index represents the response that the system will offer to cope with climate-related events. This index includes the natural- and human-made systems that each municipality will offer to reduce the impact of the climate related events. Social and infrastructures such as schools and hospitals are crucial variable often used to calculate this index. Within this project we integrated the proximity to roads, emergency accommodations, hospitals, accessibility to markets, church and vegetation index.

Adaptation Capacity(Pemba) = 0.35* [Estradas]+0.25 *[Acomodacao] +0.15* [Hospitais]+0.15* [Mercados] +0.05* [Igrejas]+0.05* [NDVI]

Adaptation Capacity(Quelimane) = 0.35* [Estradas]+0.2 * [Acomodacao]+0.2* [Hospitais]+0.2* [Mercados]+0.05* [Igrejas]+0.05* [NDVI]

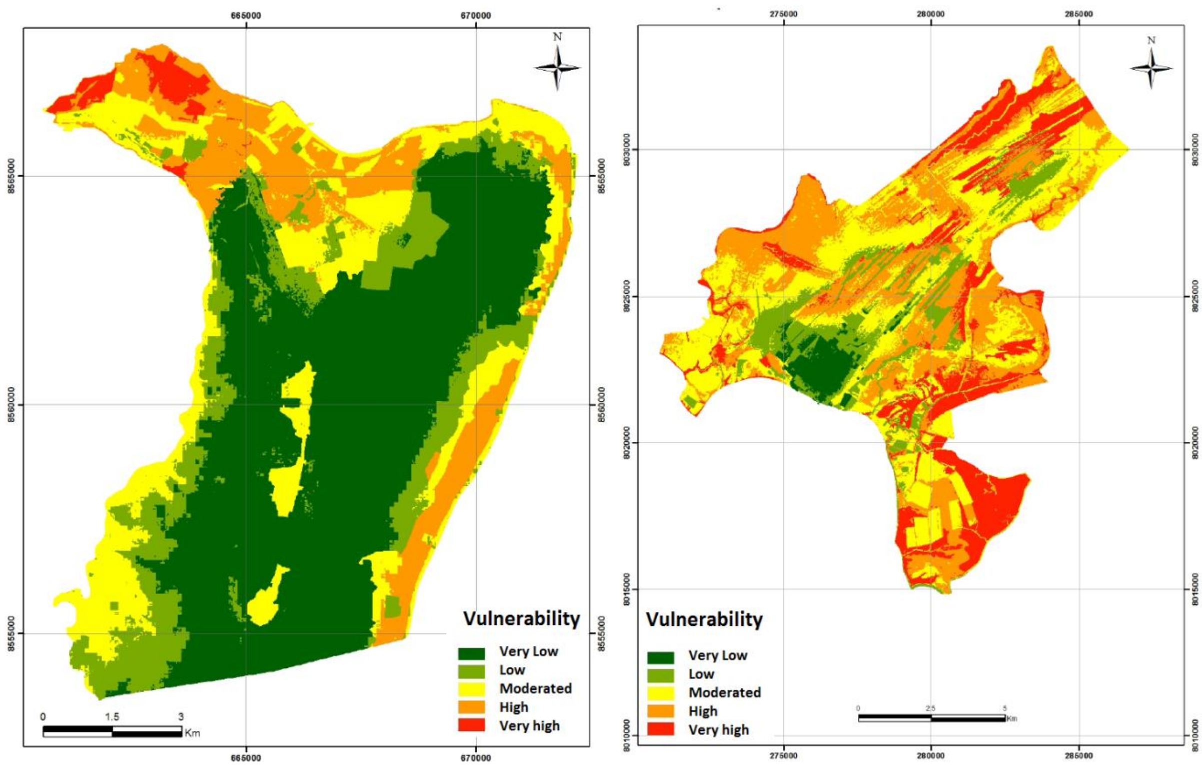



A B

**Figure 6: Maps showing the adaptation capacity of Pemba (A) and Quelimane (B) municipalities.**

## 3.4 VULNERABILITY MAP

The vulnerability map was calculated as a function of Exposure, Sensitivity and Adaptation Capacity. The recalculated indexes were averaged according to the following formula: Vulnerability = ([SENSITIVITY]+[ADAPT_CAPACITY]+ [EXPOSURE])/3. During the validation process in Quelimane, feedback from the community noted that particularly vulnerable areas weren't captured in the mapping process. To take into account this community feedback, minor adjustment were applied to the weights of Sensitivity, Adaptation Capacity and Exposure.




**A** **B**

**Figure 7:6 Vulnerability maps of Pemba (A) and Quelimane (B) municipalities.**

The vulnerability maps show areas that are likely to be endangered by natural hazards, some of them associated with the climate change.

## 3.5 SCENARIO MAPS

The scenario maps represent a complementary component of the vulnerability maps. These maps show areas that will likely be affected directly by specific stressors. Areas likely to be affected by sea-level rise were calculated considering the tidal range of each municipality. As mentioned previously, the topographic data used in this study is referred to mean sea-level; the real area to be flooded includes the area located above the mean sea-level and within the tidal range. Therefore, we subtracted half of the tidal range for each municipality from the topographic data to obtain areas that could be flooded with high tide considering the tidal range of 4.35 m for Pemba and 5.19 m. The results of this operation are available in a field column and they can be manipulated to obtain other scenarios.

We also show areas with higher risk for erosion in the municipality of Pemba. In this municipality, we explored the slopes as critical factors to initiate the erosion and combine with the vegetation cover as a factor that contributes to reduce this phenomenon. For this scenario, we used the following formula to calculate the indicative values for erosion:

Erosion_Scenar(Pemba)=([NDVI]+3* [Slope])/4

We have also estimated the areas that will likely be more impacted by future cyclones based on the city's attributes. We assume that the most risk-prone areas will be those with weak public infrastructure, valuable ecosystems, and low topography. As cyclones are characterized by heavy rain and winds, lower topographic areas are the ones often registering an increasing tides and sea-level that will exacerbate the impacts of such scenario. We applied the following simple formula to generate the column containing such data.

([Tipocasas] + [Mangrove] + [Topografia])/3

The digital version of those maps can be manipulated to visualize the intended scenarios. In ArcGIS the scenarios can be produced using the query builder and choosing the intervals to be shown in the maps.

# 4. CONCLUSIONS AND RECOMMENDATIONS

The vulnerability mapping activity in Pemba and Quelimane was conducted with the participation of the communities, capitalizing on their knowledge and experience. Mapping vulnerability is way of validating our understanding of the theoretical concept previously defined and processed arithmetically. This understanding was evident during the discussions raised in the meetings with the communities when the maps were validated. On the one hand, the communities understood the concept of vulnerability during the conceptualization of the work; on the other hand, they had certain expectations about the areas that could score higher and lower when addressing the vulnerability. We noticed that this expectation is often driven by the latest natural disasters the participants experienced. The first version of the vulnerability map for Quelimane did not match such expectation for some of the participants, which in turn led them to recommend a revision. We verified the maps and noticed that the recommendation could be satisfied with a minor change in the weights applied to the three indexes that compose the final map.

The maps described here may find use in several areas. As discussed previously, the vulnerability maps presented here show areas with the different levels of vulnerability to natural disasters. The maps visualize the perceptions and realities of the vulnerability levels and risks in various locations, allowing the decision makers to select areas requiring urgent intervention tied to Climate Change Adaptation and Disaster Risk Reduction. The end result is that the maps that can be used as a decision-making tool to inform appropriate mitigation and adaptation interventions. By providing visual information on the most and least vulnerable areas to natural disasters, we can see the relevant indexes that contribute to the increase or decrease of the total vulnerability. In the most vulnerable areas, detailed plans can be developed and refined, including early warning systems and other preparedness measures that may be structured to prevent humanitarian risks to natural disasters. Additionally, the maps can contribute to the design of detailed plans and structures for municipalities, define areas to establish higher tax rates to dissuade people from building in a particularly vulnerable area, and can be used for electronic cadaster of land use.

The vulnerability maps produced in this work reflect present conditions; however, they may also be updated as the variables and indexes changeover time. For example, the dynamics of population density, as well as changes to social infrastructure such as schools, hospitals, and other public property, may affect the vulnerability of designated areas. Taking this into account, the vulnerability maps may be used as a tool to assess the areas become increasingly prone to natural disasters, allowing the maps to serve as dynamic tools that reflect changing realities. Analyzing the three index maps, it is possible to identify the most significant variables that drive vulnerability in the municipalities. The adaptation capacity index, for example, is composed of tangible variables such as the social infrastructures which can be dimensioned towards the reduction of vulnerability. For planning purposes, for example, all maps may be used to set up practical actions. To plan areas for new household projects, as well as the limits to existing cadasters, the exposure map (which shows areas prone to natural disasters) and the sensitivity map (that shows areas with sensitive attributes) are crucial to help decide where donors and the Mozambican government should invest its resources moving forward.

Finally, the maps may be updated on a regular basis so that we can assess any changes in vulnerability levels and make changes in interventions. In other words, the vulnerability dataset may work as a baseline for monitoring progress of the current adaptation and mitigation work in Pemba and Quelimane, as well as influence future mitigation and adaption projects in the municipalities.

# 5. ATTACHMENTS

**Table 1 Table showing parameters' score from CCAP technical team for Quelimane City**

| n | Parameter | Score (CCAP) | | | | | Average | Stand. Dev |
|---|---|---|---|---|---|---|---|---|
| 1 | Topography | 8 | 10 | 10 | 5 | 7 | 8.00 | 1.89737 |
| 2 | Slope | 4 | 7 | 5 | 5 | 0 | 4.20 | 2.31517 |
| 3 | Temperature variation | 4 | 2 | 5 | 8 | 8 | 5.40 | 2.33238 |
| 4 | Precipitation | 9 | 8 | 8 | 10 | 8 | 8.60 | 0.80000 |
| 5 | Droughts | 8 | 2 | 7 | 7 | 6 | 6.00 | 2.09762 |
| 6 | Soil Type | 7 | 6 | 6 | 9 | 7 | 7.00 | 1.09545 |
| 7 | Cyclones | 5 | 5 | 10 | 10 | 6 | 7.20 | 2.31517 |
| 8 | Erosion | 3 | 4 | 4 | 4 | 6 | 4.20 | 0.97980 |
| 9 | Poverty | 5 | 6 | 8 | 8 | 9 | 7.20 | 1.46969 |
| 10 | Vegetation | 7 | 8 | 10 | 8 | 8 | 8.20 | 0.97980 |
| 11 | Mangrove | 8 | 4 | 10 | 9 | 9 | 8.00 | 2.09762 |
| 12 | Drainage system | 10 | 9 | 9 | 9 | 5 | 8.40 | 1.74356 |
| 13 | House types | 10 | 9 | 9 | 9 | 8 | 9.00 | 0.63246 |
| 14 | Land use | 8 | 5 | 6 | 7 | 7 | 6.60 | 1.01980 |
| 15 | Sacred sites | 6 | 1 | 4 | 4 | 2 | 3.40 | 1.74356 |
| 16 | Population | 8 | 5 | 10 | 8 | 8 | 7.80 | 1.60000 |
| 17 | Education | 7 | 3 | 8 | 7 | 5 | 6.00 | 1.78885 |
| 18 | Schools | 6 | 1 | 6 | 4 | 5 | 4.40 | 1.85472 |
| 19 | Latrine type/toilet | 8 | 6 | 9 | 8 | 6 | 7.40 | 1.20000 |
| 20 | Hospitals | 6 | 0 | 8 | 5 | 7 | 5.20 | 2.78568 |
| 21 | Market accessibility | 5 | 0 | 4 | 5 | 6 | 4.00 | 2.09762 |
| 22 | Subsistence means | 5 | 0 | 5 | 8 | 8 | 5.20 | 2.92575 |
| 23 | Access to loans | 5 | 5 | 5 | 4 | 7 | 5.20 | 0.97980 |
| 24 | Touristic Establishment | 4 | 3 | 7 | 4 | 7 | 5.00 | 1.67332 |
| 25 | Information accessibility | 7 | 6 | 9 | 4 | 7 | 6.60 | 1.62481 |
| 26 | Religious institutes | 7 | 2 | 5 | 6 | 5 | 5.00 | 1.67332 |
| 27 | Governmental buildings | 5 | 1 | 3 | 3 | 7 | 3.80 | 2.03961 |
| 28 | Believes | 6 | 5 | 8 | 3 | 4 | 5.20 | 1.72047 |
| 29 | Health system | 6 | 1 | 8 | 9 | 8 | 6.40 | 2.87054 |
| 30 | Bridges | 7 | 0 | 8 | 3 | 6 | 4.80 | 2.92575 |
| 31 | Roads | 8 | 2 | 9 | 8 | 6 | 6.60 | 2.49800 |
| 32 | Water sources | 8 | 5 | 9 | 9 | 8 | 7.80 | 1.46969 |

**Table 2 Table showing parameters and score from CCAP technical team for Pemba City**

| n | Parameter | Score (CCAP) | | | | | Average | Std.Dev |
|---|---|---|---|---|---|---|---|---|
| 1 | Topography | 7 | 9 | 8 | 9 | 7 | 8.00 | 0.8944 |
| 2 | Slope | 8 | 10 | 10 | 9 | 8 | 9.00 | 0.8944 |
| 3 | Temperature variation | 4 | 1 | 5 | 8 | 8 | 5.20 | 2.6382 |
| 4 | Precipitation | 7 | 7 | 9 | 8 | 8 | 7.80 | 0.7483 |
| 5 | Droughts | 4 | 2 | 9 | 7 | 5 | 5.40 | 2.4166 |
| 6 | Soil Type | 3 | 8 | 8 | 9 | 7 | 7.00 | 2.0976 |
| 7 | Cyclones | 8 | 8 | 10 | 10 | 6 | 8.40 | 1.4967 |
| 8 | Erosion | 10 | 8 | 8 | 9 | 8 | 8.60 | 0.8000 |
| 9 | Poverty | 5 | 7 | 8 | 8 | 9 | 7.40 | 1.3565 |
| 10 | Vegetation | 4 | 8 | 10 | 6 | 8 | 7.20 | 2.0396 |
| 11 | Mangrove | 6 | 4 | 7 | 7 | 9 | 6.60 | 1.6248 |
| 12 | Drainage system | 8 | 10 | 9 | 5 | 6 | 7.60 | 1.8547 |
| 13 | House types | 8 | 9 | 9 | 9 | 8 | 8.60 | 0.4899 |
| 14 | Land use | 3 | 6 | 6 | 7 | 7 | 5.80 | 1.4697 |
| 15 | Sacred sites | 6 | 1 | 4 | 4 | 5 | 4.00 | 1.6733 |
| 16 | Population | 6 | 7 | 10 | 8 | 8 | 7.80 | 1.3266 |
| 17 | Education | 7 | 2 | 8 | 7 | 5 | 5.80 | 2.1354 |
| 18 | Schools | 6 | 2 | 6 | 4 | 5 | 4.60 | 1.4967 |
| 19 | Latrine type/toilet | 8 | 8 | 9 | 6 | 8 | 7.80 | 0.9798 |
| 20 | Hospitals | 6 | 1 | 8 | 5 | 7 | 5.40 | 2.4166 |
| 21 | Market accessibility | 5 | 0 | 4 | 5 | 6 | 4.00 | 2.0976 |
| 22 | Subsistence means | 5 | 0 | 5 | 8 | 8 | 5.20 | 2.9257 |
| 23 | Access to loans | 5 | 4 | 5 | 4 | 7 | 5.00 | 1.0954 |
| 24 | Touristic Establishment | 4 | 5 | 7 | 4 | 7 | 5.40 | 1.3565 |
| 25 | Information accessibility | 7 | 7 | 9 | 4 | 7 | 6.80 | 1.6000 |
| 26 | Religious institutes | 7 | 1 | 5 | 6 | 5 | 4.80 | 2.0396 |
| 27 | Governmental buildings | 5 | 1 | 3 | 3 | 7 | 3.80 | 2.0396 |
| 28 | Believes | 6 | 8 | 8 | 3 | 6 | 6.20 | 1.8330 |
| 29 | Health system | 6 | 1 | 8 | 9 | 8 | 6.40 | 2.8705 |
| 30 | Bridges | 8 | 0 | 8 | 3 | 6 | 5.00 | 3.0984 |
| 31 | Roads | 8 | 2 | 9 | 8 | 6 | 6.60 | 2.4980 |
| 32 | Water sources | 8 | 6 | 9 | 9 | 8 | 8.00 | 1.0954 |

**Table 3 Table showing parameters and score from the participants on the meeting in Pemba City.**

| n | Parameter | Pontuacao (Pemba Participants) | | | | | | | | | | | | | | | | | | | | | Average | St. Dev. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | Precipitation | 9 | 10 | 9 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 9 | 9 | 8 | 10 | 10 | 10 | 10 | 10 | 5 | 2 | 10 | 9.095238 | 1.94948 |
| **2** | Sea-level rise | 3 | 9 | 10 | 6 | 1 | 6 | 9 | 9 | 1 | 7 | 6 | 6 | 7 | 8 | 8 | 8 | 0 | 5 | 2 | 8 | 6 | 5.952381 | 2.86981 |
| **3** | Cyclones and heavy winds | 1 | 9 | 7 | 10 | 1 | 10 | 8 | 8 | 2 | 10 | 7 | 2 | 9 | 9 | 5 | 8 | 0 | 4 | 10 | 5 | 10 | 6.428571 | 3.38866 |
| **4** | Soil type | 4 | ? | 8 | 8 | 3 | 7 | 9 | 9 | ? | 5 | ? | 1 | 10 | 5 | 9 | 10 | 10 | 6 | 2 | 3 | 10 | 6.611111 | 2.96533 |
| **5** | House type | 5 | ? | 10 | 4 | 6 | 5 | ? | 10 | 2 | 8 | 6 | 3 | 9 | 9 | 10 | 9 | 10 | 2 | 5 | 6 | 10 | 6.789474 | 2.78301 |
| **6** | Erosion | 1 | 10 | 6 | 9 | 5 | 8 | 8 | 10 | ? | 10 | 5 | 7 | 6 | 7 | 7 | 7 | 1 | 8 | 3 | 8 | 5 | 6.55 | 2.57827 |
| **7** | Landslides | 3 | 10 | 10 | 7 | 1 | 8 | ? | 7 | 1 | 10 | 8 | 2 | 7 | 4 | 9 | 10 | 2 | 7 | ? | ? | 7 | 6.277778 | 3.15886 |
| **8** | Vegetation | ? | 6 | 7 | 5 | 4 | 6 | 5 | 10 | 5 | 6 | ? | 2 | 7 | 5 | 8 | 9 | 10 | 10 | 0 | 6 | 5 | 6.105263 | 2.55250 |
| **9** | Slope | 2 | 5 | 9 | 7 | 3 | 5 | 5 | 10 | 0 | 4 | 4 | 4 | 9 | 8 | 9 | 7 | 10 | 6 | 3 | 9 | 9 | 6.095238 | 2.82682 |
| **10** | Topography | 7 | 3 | 5 | ? | 4 | 5 | 5 | 10 | ? | 0 | ? | 1 | 9 | 8 | 6 | 10 | 10 | 2 | 8 | 2 | 8 | 5.722222 | 3.14122 |
| **11** | Water retention systems | 6 | ? | 10 | 9 | 5 | 4 | 9 | 10 | 6 | 10 | 7 | ? | 10 | 10 | 7 | 10 | 10 | 2 | 9 | 4 | 3 | 7.421053 | 2.68163 |
| **12** | Drainage system | 8 | 5 | 8 | 7 | 6 | 7 | 7 | 10 | 7 | ? | 10 | 5 | 10 | 5 | 8 | 10 | 10 | 3 | 6 | ? | 10 | 7.473684 | 2.08676 |
| **13** | Urban planning | 8 | 10 | 10 | 5 | 8 | 8 | 9 | 10 | 5 | 5 | 6 | 10 | 10 | 10 | 7 | 10 | 10 | 6 | 7 | 7 | 10 | 8.142857 | 1.88442 |
| **14** | Obstruction of drainage system | 3 | 6 | 7 | 6 | 4 | 7 | 6 | 10 | 0 | 7 | ? | 6 | 9 | 8 | 5 | 10 | 10 | 3 | 3 | 3 | 9 | 6.1 | 2.73679 |
| **15** | Roads | 7 | 10 | 10 | 1 | 9 | 5 | 8 | 10 | 9 | 8 | 7 | 8 | 10 | 10 | 6 | 10 | 10 | 6 | 7 | 8 | 10 | 8.047619 | 2.21416 |
| **16** | Waste management | 6 | 10 | 10 | 3 | 8 | 5 | 3 | 10 | 6 | 9 | 5 | ? | 10 | 8 | 9 | ? | 10 | 5 | 4 | 5 | 10 | 7.157895 | 2.53944 |
| **17** | Open defecation practice | 0 | 10 | 8 | 1 | 3 | 4 | 4 | 9 | 0 | ? | 8 | 0 | 8 | 7 | 4 | 7 | 0 | 1 | 1 | 2 | 10 | 4.35 | 3.58155 |
| **18** | Mangrove (degradation) | 1 | 6 | 7 | 6 | 9 | 4 | ? | 10 | ? | 9 | 3 | 5 | 6 | 10 | 10 | 10 | 9 | 10 | 1 | 7 | 6 | 6.789474 | 2.91239 |
| **19** | Cultural behavior | 3 | 7 | 9 | 8 | 4 | 6 | 2 | 10 | 0 | 10 | ? | 7 | 8 | 9 | 8 | 10 | 5 | 5 | 5 | ? | 1 | 6.157895 | 3.01336 |
| **20** | Household evolution (expansion) | 7 | 5 | 6 | 5 | 8 | 6 | 5 | 9 | 9 | 10 | 4 | 0 | 10 | 9 | 7 | 10 | 10 | 4 | 2 | ? | 3 | 6.45 | 2.87185 |
| **21** | Population | 8 | 7 | 8 | 6 | 9 | 10 | 4 | 10 | 10 | 5 | 2 | 9 | 9 | 10 | 6 | 10 | 10 | 1 | 0 | 1 | 10 | 6.904762 | 3.36515 |
| **22** | Population growth | 4 | 6 | 7 | 7 | ? | 10 | 7 | 10 | 10 | 10 | ? | 10 | 9 | 10 | 5 | 10 | 10 | 10 | 8 | ? | 7 | 8.333333 | 1.94365 |
| **23** | Drought | 1 | 2 | 8 | 9 | 3 | 9 | 0 | 9 | 0 | ? | 1 | 7 | 7 | 9 | 8 | 10 | 0 | 1 | 5 | ? | 2 | 4.789474 | 3.69322 |
| **24** | Diseases (malaria, cholera, etc) | 0 | 8 | 6 | 8 | 2 | 9 | 6 | 10 | ? | 8 | 4 | 5 | 8 | 10 | 7 | 10 | 0 | 6 | 10 | 7 | 10 | 6.7 | 3.08383 |
| **25** | Health system | 7 | 9 | 9 | 9 | 6 | 7 | 3 | 7 | 5 | 9 | 5 | 3 | 10 | 10 | 9 | 10 | 10 | 5 | 5 | 3 | 8 | 7.095238 | 2.40841 |
| **26** | Water sources | 6 | 10 | 8 | 9 | 7 | 10 | 9 | 4 | 8 | 6 | 7 | 10 | 9 | 8 | ? | ? | 10 | 2 | 3 | 7 | 1 | 7.052632 | 2.70426 |
| **27** | Information accessibility | 7 | 10 | 6 | 8 | 10 | 10 | 8 | 6 | 6 | 7 | 3 | 8 | 8 | 9 | ? | 9 | 10 | 4 | 5 | 5 | 6 | 7.25 | 2.04634 |
| **28** | Public infrastructures | 8 | 10 | 7 | 9 | 9 | 8 | 10 | 2 | 5 | 5 | 8 | 3 | 10 | 10 | 9 | 10 | 10 | 7 | 9 | 3 | 8 | 7.619048 | 2.49716 |
| **29** | Landuse | 7 | 5 | 9 | 5 | 6 | 6 | 3 | 0 | 9 | 9 | 2 | 1 | 5 | 7 | 10 | ? | 10 | 5 | 5 | 6 | 0 | 5.5 | 3.02490 |

| n | Parametro | Pontuacao (Participantes de Quelimane) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Media | Desv. Pad |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Cheias | 10 | 8 | 10 | 9 | 10 | 8 | 8 | 10 | 8 | 10 | 2 | 3 | 10 | 10 | 10 | 10 | 10 | 8 | 9 | 10 | 10 | 10 | 10 | 1 | 10 | 10 | 4 | 10 | 10 | 10 | 10 | 10 | 10 | ? | 10 | 10 | 10 | 10 | 0 | 2 | 7 | 10 | 1 | 7 | 7 | 4 | 2 | 1 | 10 | 10 | 10 | 10 | 8.02 | 3.14668 |
| 2 | Chuvas intensas | 10 | 5 | 10 | 8 | 9 | 10 | 10 | 9 | ? | 9 | 7 | 5 | 9 | 10 | 10 | 10 | 5 | 7 | 10 | 10 | 9 | 9 | 10 | 10 | 10 | 10 | 7 | 10 | 10 | 10 | 10 | 9 | 10 | 10 | 5 | 10 | 8 | 7 | 8 | 5 | 8 | 10 | 5 | 8 | 9 | 9 | 10 | ? | 10 | 10 | 10 | ? | 8.76 | 1.68463 |
| 3 | vento (ciclones) | 8 | 7 | 10 | 6 | ? | 6 | 8 | 3 | 9 | 10 | 4 | 4 | 9 | 10 | 10 | ? | 10 | 6 | 9 | 10 | 10 | 10 | 10 | 5 | 8 | 9 | 9 | 8 | 10 | 10 | 9 | 10 | 10 | ? | 10 | 10 | 10 | 2 | 2 | 3 | 8 | 10 | 10 | 8 | 8 | ? | 8 | 4 | 8 | 8 | 8 | 10 | 8.00 | 2.38921 |
| 4 | Tipos de casas | 9 | 5 | 1 | 4 | 5 | 10 | 9 | 2 | 8 | 1 | 9 | 7 | 10 | 4 | 10 | 9 | 10 | ? | 10 | 3 | ? | 8 | 9 | 10 | 9 | 9 | 2 | 9 | 10 | 5 | 10 | 8 | 2 | 8 | ? | ? | 10 | 5 | 4 | 7 | 10 | 9 | 6 | 10 | ? | 6 | 4 | 6 | 8 | 2 | 9 | 6 | 6.96 | 2.87289 |
| 5 | Inundacoes | 10 | 10 | 5 | 10 | 7 | 8 | 8 | 7 | 6 | 10 | 6 | 7 | 9 | 10 | 10 | 3 | 9 | 5 | 10 | 9 | 10 | 5 | 7 | ? | 7 | 7 | 3 | 10 | 10 | 9 | 10 | 1 | 9 | ? | 8 | 5 | 9 | 6 | 7 | 6 | ? | 6 | 9 | 7 | ? | 3 | 10 | 9 | 10 | 9 | 10 | 4 | 7.60 | 2.33398 |
| 6 | Topografia | 8 | 9 | 1 | 10 | 8 | 3 | 7 | 1 | 4 | 2 | 3 | ? | 1 | ? | 6 | 3 | 9 | 10 | 10 | 1 | ? | 7 | 3 | 5 | 10 | 8 | 3 | 8 | 9 | 4 | 10 | 5 | 8 | 1 | 1 | 2 | 8 | 8 | 1 | 8 | 10 | 0 | 3 | 9 | 2 | 2 | 8 | ? | 8 | 8 | ? | 1 | 5.45 | 3.35051 |
| 7 | Proximidade aos pantanos | 7 | 8 | 1 | 8 | 10 | 8 | 10 | 8 | 10 | 1 | 8 | ? | 8 | ? | 1 | 8 | 10 | 3 | 9 | ? | 7 | 4 | 9 | 7 | 10 | 5 | 5 | 10 | 10 | 9 | 10 | 7 | 4 | 8 | 9 | ? | 10 | 8 | 3 | 7 | 10 | 10 | 10 | 9 | 5 | 4 | 8 | 5 | 10 | 10 | 10 | 10 | 7.52 | 2.67698 |
| 8 | Erosao dos solos | 8 | 9 | 1 | 9 | 9 | 10 | 9 | ? | 8 | 8 | 6 | 5 | ? | 9 | 9 | 9 | 8 | 2 | 8 | 10 | 7 | 3 | 5 | 5 | 8 | 5 | 10 | 1 | 9 | 7 | 9 | 3 | 10 | 9 | 9 | 10 | 7 | ? | 2 | 8 | ? | 9 | 7 | 5 | ? | 9 | 4 | 10 | 10 | 10 | ? | ? | 7.29 | 2.62993 |
| 9 | Subida do nivel do mar | 9 | 5 | 1 | 5 | 10 | 9 | 9 | 9 | 9 | 7 | 7 | 6 | 2 | 5 | 9 | 9 | 9 | 1 | 10 | 10 | 6 | 2 | 7 | 5 | 10 | 6 | 6 | 1 | 8 | 6 | 10 | 0 | 0 | 5 | 7 | ? | 9 | 7 | 1 | 4 | 8 | 2 | 8 | 6 | ? | 2 | 4 | ? | 10 | 9 | ? | 5 | 6.15 | 3.06859 |
| 10 | Construcoes desordenadas | 7 | 10 | 2 | 10 | 8 | 9 | 10 | 7 | 10 | 2 | 10 | 8 | 7 | 9 | 10 | 8 | 8 | 4 | 7 | 4 | 8 | ? | 5 | 6 | 10 | 5 | 8 | 10 | 7 | 8 | 10 | 4 | 7 | 7 | 8 | 10 | 10 | 9 | 3 | 8 | 9 | 9 | 10 | 10 | 7 | 10 | 8 | 8 | ? | 9 | 8 | 7 | 7.76 | 2.16850 |
| 11 | Destruicao de mangais | 8 | 9 | 3 | 10 | 4 | 10 | 10 | 8 | 8 | 9 | 8 | 9 | 10 | 10 | 10 | ? | 7 | 1 | 10 | 9 | 10 | 4 | 9 | 10 | 10 | 4 | 6 | 10 | 7 | 3 | 10 | 0 | 1 | 8 | 9 | ? | 10 | 5 | 0 | 7 | 10 | 9 | 10 | 8 | 4 | 9 | 8 | 5 | 6 | 8 | ? | ? | 7.35 | 2.94738 |
| 12 | Saneamento (lixo) | 9 | 10 | 3 | 10 | 10 | 10 | 10 | 10 | 9 | 1 | 9 | 9 | 7 | 8 | 8 | 3 | 2 | 4 | 10 | 5 | ? | 5 | 7 | 3 | 10 | 7 | 7 | 8 | 10 | 4 | 8 | 2 | 0 | 10 | 10 | 3 | 10 | 7 | 5 | 5 | 3 | 6 | 6 | 9 | 3 | 4 | 1 | 3 | 10 | 5 | 8 | 5 | 6.49 | 3.01872 |
| 13 | Extracao de solos | 7 | 9 | 1 | 10 | 7 | 7 | 7 | ? | 7 | 5 | 8 | 5 | 5 | ? | 7 | 7 | 2 | 3 | 1 | 6 | 7 | 7 | 6 | 2 | 8 | 6 | 6 | 10 | 6 | 3 | 6 | 0 | 0 | 4 | 5 | ? | 10 | 5 | 9 | 8 | 2 | 2 | 2 | 7 | ? | 2 | ? | 7 | 10 | 1 | 10 | 5 | 5.53 | 2.84979 |
| 14 | Desflorestamento | 10 | 10 | 5 | 10 | 9 | 6 | 10 | 9 | 10 | 2 | 8 | 6 | 10 | ? | 1 | 7 | 4 | 2 | ? | 8 | 8 | 4 | 5 | 5 | 10 | 6 | 9 | 10 | 5 | 2 | 9 | 0 | 0 | 7 | 8 | ? | 10 | 8 | 0 | 7 | 5 | 0 | 9 | 4 | ? | 5 | 3 | ? | 8 | 7 | ? | ? | 6.24 | 3.19135 |
| 15 | Sistemas de drenagem | 9 | 8 | 7 | 5 | 10 | 9 | 10 | 10 | 8 | 10 | 9 | 6 | 10 | 10 | 10 | 4 | 3 | 10 | 1 | 7 | 10 | 8 | 5 | 10 | 10 | 8 | 5 | 10 | 10 | 5 | 9 | 2 | 9 | 1 | 1 | 7 | 10 | 10 | 5 | 8 | 10 | 9 | 9 | 9 | 10 | ? | 3 | ? | 10 | 1 | 10 | 5 | 7.50 | 2.93428 |
| 16 | Vias de acesso | 5 | 7 | 5 | 6 | 10 | 10 | 9 | 10 | 9 | 2 | 7 | 7 | 5 | 9 | 10 | ? | 9 | 10 | 2 | 10 | ? | 7 | 9 | 6 | 8 | 7 | 5 | 10 | 10 | 7 | 10 | 4 | 5 | 1 | 1 | ? | 9 | 10 | 10 | 8 | 7 | 3 | 10 | 10 | ? | 10 | 8 | 5 | 10 | 9 | 10 | 10 | 7.52 | 2.67698 |
| 17 | Abate e ocupacao de mangal | 7 | 5 | 1 | 10 | 10 | 9 | 5 | 6 | 7 | 9 | 8 | 9 | 9 | 9 | ? | 4 | 3 | 1 | ? | 9 | 2 | 3 | 10 | 8 | 10 | 6 | 6 | 10 | 2 | 1 | ? | 0 | 5 | 7 | 7 | 10 | 6 | 10 | 1 | 9 | ? | 2 | 8 | ? | 6 | 10 | 0 | 5 | 10 | 7 | ? | 10 | 6.35 | 3.23175 |
| 18 | Funciionamento das pontecas (uso incorrecto) | 8 | 4 | 1 | 6 | 9 | 8 | 10 | 3 | ? | 3 | 6 | 5 | 7 | 8 | 1 | 4 | 9 | 4 | 9 | 5 | 10 | 5 | 9 | 10 | 8 | 8 | 8 | 10 | 7 | 3 | 3 | 6 | 7 | 8 | 8 | 5 | 10 | 6 | 4 | 7 | 10 | 2 | ? | 8 | 3 | 3 | 0 | 9 | 4 | 1 | 10 | 10 | 6.24 | 2.88139 |
| 19 | Poluicao do ar (relacionado com fabricas) | 10 | 4 | 1 | 5 | 8 | 10 | 8 | 3 | 7 | 1 | 1 | 5 | ? | ? | 0 | 4 | 7 | ? | 1 | 7 | 5 | 2 | 9 | 1 | 5 | ? | 8 | 10 | 9 | 2 | 2 | 3 | 0 | 6 | 9 | ? | 5 | 6 | 3 | 4 | 7 | 0 | 4 | 2 | 2 | ? | 0 | 4 | 3 | 2 | ? | ? | 4.43 | 3.04808 |
| 20 | Fontes de agua potavel | 7 | 6 | 1 | 5 | 10 | 7 | 10 | 7 | 7 | 3 | 9 | 6 | 8 | ? | 7 | 4 | 4 | 1 | 2 | 10 | 1 | 8 | 9 | 5 | 7 | 5 | 7 | 6 | 10 | 3 | 5 | 4 | 3 | 1 | 1 | | 10 | 4 | 10 | 8 | 9 | 7 | 9 | 6 | 8 | 10 | 0 | ? | 7 | 1 | 9 | 10 | 6.06 | 3.01972 |
| 21 | Comunicacao (rede telefonica, radio, tv) | 9 | 7 | 5 | 8 | 10 | 7 | 9 | 10 | 7 | 4 | 10 | 5 | ? | 8 | 1 | 4 | 9 | 10 | 10 | 9 | 10 | 6 | 10 | 7 | 10 | 5 | 9 | 5 | 8 | 8 | 3 | 5 | 6 | 1 | 1 | | 10 | 10 | 5 | 7 | 8 | 9 | 10 | 6 | ? | 2 | 0 | ? | 9 | 2 | 10 | ? | 6.89 | 2.94802 |
| 22 | Corrente electrica | 9 | 5 | 5 | 8 | 10 | 7 | 9 | 2 | 9 | 4 | 7 | 3 | 4 | 7 | 6 | 4 | 8 | 10 | 10 | 2 | 10 | 7 | 10 | 5 | 6 | 7 | 6 | 5 | 10 | 7 | 2 | 6 | 4 | 1 | 1 | | 10 | 10 | 8 | 4 | 3 | 8 | 9 | 7 | 10 | 6 | 0 | ? | 9 | 1 | 9 | ? | 6.33 | 2.91644 |
| 23 | Rede de transporte (Fluvia/maritimo) | 6 | 3 | 8 | 4 | 9 | 5 | 8 | 4 | 6 | 2 | 10 | 4 | 4 | 1 | 0 | ? | 8 | ? | 1 | 4 | ? | 1 | 10 | 5 | 5 | 4 | 7 | 3 | 4 | 9 | 1 | 2 | 7 | 1 | 1 | 7 | 9 | 10 | 10 | 4 | 5 | 5 | 8 | 1 | ? | 3 | 2 | 7 | 3 | 1 | ? | ? | 4.83 | 2.96578 |
| 24 | Doencas (malaria, colera/diarreia, etc) | 10 | 10 | 7 | 10 | 10 | 10 | 10 | 10 | 10 | 2 | 10 | 5 | 7 | 6 | 10 | 6 | 7 | ? | 10 | 10 | ? | 9 | ? | 7 | 10 | 4 | 8 | 9 | 10 | 9 | 5 | 9 | 9 | 10 | 10 | 10 | 10 | 0 | 9 | 9 | 6 | 8 | 10 | 8 | 10 | 10 | 5 | ? | 10 | 10 | ? | 7 | 8.32 | 2.32568 |
| 25 | socorros) | 6 | 1 | 9 | 5 | 10 | 10 | 10 | 5 | 10 | 8 | 10 | 7 | 2 | 5 | 3 | 10 | 8 | 10 | 10 | 8 | 10 | 5 | 10 | 8 | 10 | 6 | 9 | 7 | 10 | 9 | 1 | 10 | 5 | 1 | 1 | | 10 | 10 | 10 | 3 | 4 | 9 | 9 | 9 | 6 | 4 | 3 | 9 | ? | 5 | 10 | ? | 7.14 | 3.01696 |
| 26 | Posicao socio economica (nos diferentes bairros) | 7 | 5 | 9 | 5 | 10 | 5 | 8 | 3 | 8 | 2 | 10 | 5 | 7 | 3 | 10 | 4 | 8 | 5 | 9 | 9 | ? | 7 | 8 | 2 | ? | 5 | 1 | 9 | 3 | 7 | 3 | 9 | 8 | 1 | 1 | 10 | 10 | 10 | 10 | 4 | 10 | 8 | 6 | 3 | 5 | 10 | 5 | ? | 9 | 6 | 10 | 10 | 6.57 | 2.89264 |
| 27 | Centros de acomodacao (em caso de emergencia) | 8 | 5 | 7 | 5 | 10 | 9 | 9 | 2 | 9 | 5 | 3 | 6 | 7 | 4 | 4 | 5 | 9 | 6 | 8 | 6 | 10 | 5 | 9 | 6 | 8 | 4 | 9 | 1 | 10 | 9 | 4 | 10 | 7 | 1 | 1 | 9 | 10 | 10 | 7 | 4 | 9 | 9 | 10 | 3 | 9 | 9 | 0 | 9 | 9 | ? | 10 | 8 | 6.78 | 2.84442 |
| 28 | Sistemas de aviso previo (eficiencia) | 7 | 1 | 7 | 0 | 10 | 10 | 10 | 5 | 7 | 10 | 10 | 7 | 10 | 9 | 10 | 10 | 9 | 10 | 10 | 8 | 10 | 8 | 7 | 5 | 10 | 9 | 8 | 1 | 10 | 10 | 2 | 9 | 8 | 1 | 1 | | 7 | 10 | 5 | 4 | 9 | 10 | 8 | 4 | 10 | ? | 1 | 8 | ? | ? | 10 | 6 | 7.31 | 3.12354 |
| 29 | Nivel de escolaridade | 5 | 5 | 9 | 6 | 10 | 6 | 7 | ? | 8 | 1 | 2 | 6 | 7 | 7 | 10 | 5 | 6 | 6 | 5 | 4 | 5 | 9 | 9 | 7 | 8 | 6 | 7 | 7 | 9 | 8 | 2 | 7 | ? | 1 | 1 | | 10 | 10 | 10 | 7 | 10 | 4 | 4 | 4 | 8 | 10 | ? | ? | 5 | ? | 8 | 9 | 6.52 | 2.56005 |
| 30 | Crencas | 9 | 3 | 5 | 7 | 7 | 6 | 6 | 10 | 9 | 1 | 5 | 5 | 3 | 8 | 1 | 4 | 2 | 4 | 4 | 5 | 5 | 7 | 4 | 5 | 3 | 3 | 6 | 1 | 1 | 2 | 2 | 1 | 0 | 1 | 1 | | 6 | 7 | 8 | 5 | 6 | 2 | 6 | 2 | 7 | 4 | 0 | ? | 9 | 1 | ? | 7 | 4.41 | 2.66434 |

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