



CIDMA

Climate Change Induced Disaster Management in Africa

Building education capacity to improve disaster management in Mozambique

Project Number: 610153-EPP-1-2019-1-SE-EPPKA2-CBHE-JP

EVALUATION REPORT

by

Marinos Kavouras

Professor

National Technical University of Athens

March 2023



Co-funded by the
Erasmus+ Programme
of the European Union

Contents

- Preface 3
- 1. Introduction 4
- 2. Requirements analysis 5
- 3. Development of course materials..... 6
- 4. Translation of course materials 7
- 5. Development of DMT..... 8
- 6. Purchase of equipment..... 8
- 7. Training of Trainers 8
- 8. Accreditation of Courses..... 9
- 9. Installing e-learning systems..... 9
- 10. Installing iMSEP/DMT 9
- 11. Dissemination 10
- 12. Quality assurance and Evaluation..... 10
- 13. Project management 11
- 14. Conclusion..... 11

Preface

Climate Change Induced Disaster Management in Africa (CIDMA) - *Building education capacity to improve disaster management in Mozambique* is a 3-year project¹ funded by the European Commission under Erasmus + Key Action 2: - Cooperation for innovation and the exchange of good practices – Capacity Building in the field of Higher Education (CBHE).

The CIDMA [consortium](#) is composed of 8 partner Institutions from four countries, namely three programme countries (Sweden, Portugal, Italy) and one partner country (Mozambique):

1. [Lund University](#) (LU) (Project Coordinator)
2. [Universidade de Lisboa](#) (UL)
3. [Politecnico di Milano](#) (Polimi)
4. [Royal Institute of Technology](#) (KTH)
5. [Eduardo Mondlane University](#) (UEM)
6. [Lúrio University](#) (UUL)
7. [Zambezi University](#) (UUZ)
8. [Academy of Sciences of Mozambique](#) (ASM)

and 17 Associated Partners in Mozambique:

1. Ministry of Science and Technology, Higher and Technical-Professional Education
2. Ministry of Public Works, Housing and Water Resources
3. Ministry of Agriculture and Food Security
4. Ministry of Land, Environment and Rural Development
5. Ministry of Education and Human Development
6. Higher Institute of Science and Technology of Mozambique
7. Catholic University of Mozambique
8. National Institute of Meteorology
9. National mapping and remote sensing center
10. National Road Administration
11. Institute of Physical Planning and Environment
12. Institute of Free and Distance Learning
13. Regional Water Administrations
14. Administration of Water and Sanitation Infrastructures
15. National Institute of Health
16. Handicap International, Mozambique
17. FAO, Mozambique

The current evaluation has been conducted using the information available on the project website <https://cidma.eu/>, online meetings, and the project proposal.

¹ Call for Proposals 2019 - EAC/A03/2018, Project Number: 610153-EPP-1-2019-1-SE-EPPKA2-CBHE-JP

1. Introduction

Mozambique is highly vulnerable to climate change, with frequent extreme weather events that affect a population insufficiently prepared for them. Poverty, weak institutional development, and the high number of people working in agriculturally oriented livelihoods all contribute to the country's vulnerability. The country's education system needs to be strengthened, including the development of scientifically based spatial analysis for disaster management. The political branch needs the best possible information and more educated civil servants to compile data, evaluate extracted information, and provide a guarantee for decision makers in public authorities that best practice is the base for actions. The need to strengthen the knowledge of civil servants at all levels of public authorities in the field of disaster management is profound.

The present academic courses relating to disaster management are restricted to a few courses at the Bachelors level at Mozambican universities, and more courses focusing on practice and implementation of data management, modelling the causes of disaster, and analysing the consequences of events are urgently needed. University teaching in Mozambique is mainly traditional, focusing on campus courses, and there is a need to include distance/blended teaching and learning in the proposed courses to increase access to education. A common tool for making data and models accessible, which can be used to collect and visualize disaster-related data and model potential scenarios of climate-induced disasters, is also necessary.

In this context, the CIDMA project, addresses exactly this real need, that is, building capacity on using spatial methods for a better management of climate change induced disasters in Africa (in general) and Mozambique (in particular). Disaster management is improved by developing courses in disaster management, training trainers, implementing developed courses at partner universities in Mozambique, improving infrastructure, developing a Disaster Management Tool (DMT), and disseminating outputs and outcomes. The project has focused on spatial data and methods, using digital maps, satellite data, and spatial modelling, to predict and prepare for risks related to possible disasters linked to a changing climate. The project also aims to develop Higher Educational Institutions (HEIs) within society by strengthening links between HEI, government, and enterprises/NGOs.

The specific objectives of the project, as described in the project proposal, have been to:

- Develop up-to-date courses in disaster management
- Train trainers
- Implement the developed courses at the partner universities in Mozambique
- Improve quality in education and teaching
- Improve infra-structure at the partner universities in Mozambique
- Develop and implement a Disaster Management Tool (DMT)
- Disseminate outputs and outcomes
- Develop Higher Educational Institutions (HEIs) within society

The three (3) courses developed are based on the Bologna process, and focus on "Disaster Risk and Climate Change", "Spatial Modelling for Disaster Analysis", and "Public Participatory GIS and Spatial Data Infrastructure in Disaster Management". The courses will be offered online through e-Learning techniques, making it possible for students to study at university level from remote locations. The web-based Disaster Management Tool (DMT) which has been developed is used to collect, store, analyse, and disseminate data and information related to disaster management, making it widely available for stakeholders at all levels.

The CIDMA target groups identified are the following four:

- Universities and university staff
- University students
- Authorities, organisations, and companies involved in disaster management, planning etc.
- The public, including vulnerable groups

The project is expected to have spill-over effects to other countries in East/South East Africa, with similar challenges as Mozambique.

CIDMA information, progress and accomplishments can be found in project website <https://cidma.eu/>. The E.4 Logical Framework Matrix (LFM) in the proposal provides sufficient detail about the project.

Following this information, the main characteristics and accomplishments of the project are summarised and evaluated thereafter, under the following sections:

- Requirements analysis
- Development of course materials
- Translation of course materials
- Development of DMT
- Purchase of equipment
- Training of Trainers
- Accreditation of Courses
- Installing e-learning systems
- Installing iMSEP/DMT
- Dissemination
- Quality assurance and Evaluation
- Project management

The concluding section provides an overview of the evaluation of the Project.

2. Requirements analysis

A very important activity during the preparation stage of the project (WP2) was the requirement analysis. This analysis was essential for setting two main aims in line with the main objectives of the project:

- Identifying the most important disaster management issues in Mozambique to be used for the development of the innovative courses.
- Identifying the basic requirements for the development of the Disaster Management Tool (DMT).

In this context, the requirement analysis has been conducted by the Mozambique partners at two levels:

Level 1: [Requirements analysis report](#) (May 2020) prepared by Partner universities, with a more local and planning/practical perspective (this report is in English).

Level 2: [Requirements analysis: national view](#) (August 2020) prepared by the Academy of Science of Mozambique, which is in charge of disaster risk management in the country, with a more national and policy-making perspective (this report is in Portuguese).

It is important to state that the needs analysis covered geographically all regions of the country (North, Middle and South) taking into advantage the corresponding location of the three university partners:

- UniLurio university (Northern part of Mozambique)
- UniZambeze university (Middle part of Mozambique)
- Eduardo Modnlane University (Southern part of Mozambique)

The methodology employed to conduct the analysis combined visits to organizations, interviews with experts and filling 2 questionnaires (prepared by CIDMA participants during the kick-off meeting in Lund in January 2020) to collect information and identify needs analysis. In total, 59 experts from target institutions were interviewed mostly online due to covid restrictions.

The approach and methodology employed were well-prepared, executed appropriately, and yielded vital information to meet the project objectives of designing and developing innovative courses and the Disaster Management Tool (DMT). The requirements analysis was a fruitful and necessary task that successfully paved the way for subsequent project activities.

3. Development of course materials

According with the proposal and requirements analysis, the following three (3) courses have been developed (WP2 & WP3) to meet the CIDMA objectives, taking also into account the findings of the preceding requirement analysis:

1. [Disaster Risk and Climate Change](#)
2. [Spatial Modelling for Disaster Analysis](#)
3. [Public Participatory GIS and Spatial Data Infrastructure in Disaster Management](#)

The first course focuses on providing in-depth knowledge about the different types of disasters that can be expected to occur in a southern African coastal region due to extreme climate events. The second course is more practical, aiming to develop skills to model disasters using geospatial data like satellite imagery, elevation models, and rainfall data. The third course deals with public participatory GIS and spatial data infrastructure in disaster management, discussing how to predict and prepare for disasters and how to use public data to train models and test different scenarios.

Each course consists of a standard module, which is equivalent to 10 ECTS (250 hours of engagement), and an advanced module of 5 ECTS (125 hours of engagement). The advanced module has a prerequisite of completing the standard module. Course 1 includes a 5 ECTS module on hydrological modelling, Course 2 includes a 5 ECTS module on advanced spatial methods, and Course 3 includes a 5 ECTS module on a deeper engagement with VGI, SDIs, programming competencies, and developer skills. All courses provide a well-adjusted blending of theory and practice. The distribution of student engagement and workload in all aspects of the course (lectures, lab exercises, self-study, seminar, and final project) is reasonable, justifying the assigned 10+5 ECTS.

Syllabus documentation is sufficiently detailed and complete for all courses. It follows the same template covering: *course hour distribution by methods of studies, intended audience, course aim, three levels of learning outcomes, educational methodology, student assessment, prerequisites,*

tentative per week schedule of lectures/exercises/labs/self-study/seminar/project, bibliography and IT resources.

A Moodle has been setup² by Lund University for saving, sharing and continuously enhancing course materials. Access is password protected. Some limited access is allowed for guests but does not permit self-enrolment. Managing and accessing the courses and the classes is fairly straightforward exploiting the functionality offered by the popular Moodle platform.

Regarding course aim and content, all three courses are very relevant to CIDMA objectives as they have been detailed in the project requirement analyses, and cover most disaster management issues very satisfactorily. They differ in perspective but complement each other in the sense that they form a core direction. All geospatial approaches and technologies used (GIS, RS, Earth Observation and Mapping, SDIs, etc.) are quite modern and they rely on open approaches and data. The high quality and innovative character of the courses developed reflects the long expertise of the partners involved, especially the European ones, but also their close cooperation with the Mozambique partners and the serious attention paid to their requirements.

The courses offered are both challenging and suitable for university-level students, while still being feasible for fulfilling course requirements. The courses are designed to pique students' curiosity by presenting them with real environmental cases and incorporating attractive technological instruments. Furthermore, these courses are applicable to a variety of similar situations in East/Southeast Africa, making them valuable and relevant beyond the classroom.

Undoubtedly, the three courses developed are one of the most important and pivotal components of the project. Their comprehensive and structured curricula provide students with a thorough understanding of the key concepts and practical tools required to improve disaster management in Mozambique using geospatial information technology. Moreover, these courses offer students opportunities to network with peers, engage in hands-on learning experiences, and collaborate on projects that can lead to meaningful and impactful results. In summary, the CIDMA capacity building courses are an excellent investment in personal and professional development and are sure to yield numerous benefits both in the short and long-term, making them an invaluable asset for students and the community alike.

4. Translation of course materials

All three courses have been developed in English, allowing for internationalization at partner universities, which opens the possibility of accepting international students and training local students in the English language. Furthermore, this implies language training for Mozambique university teachers/developers, as the courses will be jointly developed by all partners. According to the proposal (WP3/D2), the lectures will be translated into Portuguese, allowing for broader access to the courses. The translated course materials will be used for evaluation and further usage by the students. All lectures have subtitles and are uploaded to YouTube. Links have been updated on Moodle.

² <https://moodle-cidma.gis.lu.se/login/index.php>

5. Development of DMT

The development of a web-based Disaster Management Tool (DMT) (WP6) was an important objective of the CIDMA project and was highlighted in the requirement analysis. This system captures, stores, analyses, and disseminates data and information related to disaster management, making it essential not only for the developed courses but also for wider use by stakeholders at all levels, including small and medium enterprises, NGOs, governmental bodies, and the general public. By making disaster risk spatial data widely available, the resilience, planning, and decision-making in Mozambique can be significantly improved.

Based on the proposal and requirement analysis, the consortium at the preparation stage (WP2) finalized the desired DMT functionalities. It then proceeded (WP6) with the development of an early warning system based on the concept of citizens as sensors, which is integrated into the DMT. The process included design, implementation, testing and usability assessment and completion of the system.

Mozambique is a low-income country, and establishing advanced early warning systems based on high-tech sensors is not feasible. The creative solution is to use citizens as sensors, where DMT listens to Tweets and detects disasters or risks that citizens have tweeted about at their early stages, issuing a warning. The DMT has been integrated into [iMSEP](#), a standard free open web GIS system, so disaster managers and planners can use GIS functions and analysis for disaster risk management and planning. This innovative approach shows the potential of technology in addressing real-world challenges and contributing to disaster management efforts in Mozambique.

6. Purchase of equipment

A specific aim of the project was to improve infra-structure at the partner universities in Mozambique, in the form of well-equipped laboratories. As per the proposal outlined in WP2, all the university partners in Mozambique have procured equipment for their laboratories and e-Learning systems. Initially, the Academy of Science had budgeted for equipment, but the EU commented that it would be illegal for them to do so. Therefore, the equipment budget that was allocated to the Academy of Science was divided between the three universities. Despite this setback, all three universities were able to purchase the necessary equipment, ensuring that the project could proceed as planned.

7. Training of Trainers

According to the plan in WP4, a number of different ToT activities took place with the aim to train faculty members at the partner universities and at the ACM on the following:

- How to teach the developed courses
- How to teach in e-learning mode
- What is blended teaching and learning
- European standards and policies for teaching
- European standards for crediting and grading
- How to use DMT and iMSEP

As reported in the project website, ToT has been implemented and carried out to guarantee project sustainability. The aim of the ToT was that European and Mozambican academic staff jointly teach the developed courses to the students and exchange European experiences in teaching and education in practice. This has resulted in meetings between different cultures of teaching and learning, as well as between different use of technology and research agendas. It included components of modernization and internationalization, as well as development.

Trainers from partner institutions have been trained in Mozambique (Maputo, April 2022) and Europe (Lisbon, Portugal, September 2022). Other ToT activities were carried out in Mozambique in November and December 2022. During another online meeting in June 2020, one of the topics was the use of iMSEP for teaching activities in Mozambique. The technology of iMSEP was also used to develop a web-based disaster management tool (DMT) to support decision-making for disaster management in Mozambique.

Overall, the ToT activities were very successfully accomplished in accordance with the project objectives.

8. Accreditation of Courses

An important accomplishment of the Project, has been the recognition of the three Courses and the incorporation of their materials into their existing University Programmes since 2021, as explicitly stated³ by the three Mozambique Universities (Eduardo Mondlane University, Lúrio University and Zambezi University). This had also been planned in the proposal (on pg. 65) *“The developed courses will be merged into existing programmes or specialization to a programme. The courses do not need to be submitted to Ministries of Higher Education (MHE) for accreditation.”*.

The actual teaching of students on the materials covered by the three recognized courses, has taken place during the spring and fall semesters in all three Mozambique universities.

9. Installing e-learning systems

After the servers were set up in our partner universities (as part of the equipment), the popular e-learning platform Moodle was installed on each of them in accordance with WP5. The course materials have been uploaded to all Moodle sites and are successfully supporting the courses. The eLearning system setup and training on how to set up and use it were carried out by LU in Maputo. UEM then shared this knowledge with the other Mozambique partners through events in Maputo, Pemba, and Beira.

10. Installing iMSEP/DMT

As [previously](#) mentioned, the Disaster Management Tool (DMT) as a web-based early warning system has been incorporated into iMSEP, resulting in the iMSEP/DMT platform. This platform has been implemented at Eduardo Mondlane University (UEM) and is currently being utilized for training purposes. Its primary objective is to aid decision-making related to disaster management in Mozambique.

³ https://cidmaeu.files.wordpress.com/2022/11/course_accreditation.pdf

11. Dissemination

In the context of WP8 – Dissemination and Exploitation, a number of important activities were envisaged and implemented. These include:

- Creating project website, where all project information has been uploaded there, in a transparent way. <https://cidma.eu/>
- Publication in conferences
- Publishing in newspapers, TV, Facebook, etc.
- Holding dissemination workshops
- Teaching the courses

The project website is well designed and provides comprehensive information about the CIDMA project, including its objectives, outputs, quality assurance, partners, and news about events. Additionally, the partners' area features resources the management plan, and detailed minutes from all project meetings.

By means of these dissemination activities, individuals participating in the course, members of the public, and environmental management authorities, organizations, and companies involved in policy-making, planning, and operational interventions will gain knowledge about the benefits and applications of using spatial modelling and public web-based systems to enhance resilience and mitigate the impact of climate-induced disasters in Mozambique.

Similarly, Mozambique's higher educational institutions (HEIs) establish stronger connections with society, raising awareness among stakeholders about the necessary skills and technologies, as well as the pool of educated graduates who can be recruited to meet these requirements.

12. Quality assurance and Evaluation

Achieving the objectives of such a demanding project necessitates the implementation of rigorous monitoring and quality assurance mechanisms, which were the focus of WP7. To ensure project activities, processes, deadlines, and outputs met high standards, a Quality Control Group (QCG) was formed.

Several quality mechanisms were implemented, including:

- Course development progress reporting
- Quality of courses was evaluated by experts (pilot students) – For this activity, Lund University set up an e-learning platform based on Moodle and AC. Teachers from Europe and Mozambique were involved to supervise the pilot students and give feedback on their submitted assignments. 16 students studied and evaluated the courses. A [summary of course evaluation reports](#) is available on the project website with very useful observations. The courses were improved based on the feedback of experts.
- Evaluation of DMT by experts; 7 experts evaluated DMT.
- Overall evaluation of the project by 2 external experts.

The QCG maintained continuous responsibility for all project-related aspects and provided frequent updates to the Steering Committee (SC). The timely decision-making process led to the attainment of high-quality outputs, and the project successfully stayed on track.

13. Project management

Project Coordination and Management was specifically tackled in WP9. To ensure the efficient and effective management and implementation of the project, the partnership had to undertake various activities that guarantee success in scientific, administrative, and financial aspects. The ultimate goal was for the CIDMA project to achieve its objectives and execute the proposed work plan smoothly, with attention to quality, interdependencies among activities, and prompt delivery of interim and final results. A comprehensive [management plan](#) was created, which included a detailed timeline, clearly defined roles and responsibilities, and regular progress updates. Besides the general but very useful overview of the project, the management plan described the CIDMA management structure (top level and project level), meetings and communication, payments, administrative and financial reporting, financial rules - cost eligibility, and supporting documents. The plan was executed with precision, and every partner knew exactly what was expected of them.

Several key factors contributed significantly to the successful management of CIDMA and the establishment of clear communication channels, some of which were:

- The project was led by LU, a highly experienced partner in managing EU projects, serving as the project coordinator. Leveraging its extensive expertise, LU played a crucial role in ensuring the success of the project, overseeing all aspects of project planning, implementation, and management. As the coordinating partner, LU was responsible for facilitating communication and collaboration among all project partners, ensuring that the project remained on track and aligned with its objectives.
- The project established a Steering Committee (SC) consisting of representatives from all partners. The SC played a vital role in decision-making, ensuring that management was carried out democratically and with the active participation of all partners. This approach enabled the project to benefit from the diverse perspectives and expertise of all stakeholders, resulting in a more inclusive and collaborative management process.
- Despite the challenges posed by the pandemic, the consortium maintained regular meetings, conducting them online to ensure the safety of all participants. The minutes of these meetings were made available on the project website, promoting transparency and accountability. This approach ensured that all consortium members were kept up-to-date on project progress, challenges, and decisions, regardless of their physical location. Additionally, by publishing these meeting minutes on the project website, the consortium fostered greater engagement and collaboration among all stakeholders.
- To ensure compliance with EU and LU regulations, a dedicated financial manager was assigned to the project. The financial manager played a critical role in maintaining accurate and complete financial records, preparing regular reports, and ensuring that all documentation was up-to-date and in line with regulatory requirements. By entrusting this important responsibility to a dedicated professional, the project team was able to focus on other aspects of the project, knowing that their finances were in capable hands.

14. Conclusion

The project being discussed is innovative at both the country and global levels, introducing new approaches to capacity building and knowledge exchange. In Mozambique, the project uses new

spatial analysis methods and technologies such as GIS, remote sensing, and SDI for climate change studies and disaster management. It also incorporates e-Learning to reach vulnerable groups and encourage vocational training. The project has three main innovative elements within Mozambique: providing an integrated suite of spatial methods/climate change/disaster management courses and educational resources, combining formal class-based teaching with flexible long distance online learning, and interconnecting the educational systems of the non-European partners to the European educational system. At the global level, the project has developed innovative blended courses and a web-based early warning system (DMT) for capturing, sharing, integrating, and analysing spatial information. It has also introduced new technological approaches to collect and share spatial data and information, handle Big Data and processes in an integrative way, and promote exchange between open access global and local databases. All of these innovative elements will help build capacity in Africa.

The CIDMA consortium is a shining example of performance and dedication, characterized by a team of highly skilled and knowledgeable specialists who bring diverse perspectives and expertise to the project, freely sharing resources and ideas to maximize the project's impact. The project's outputs and outcomes are a testament to this high level of expertise and dedication. LU's management team effectively coordinates the efforts of consortium members, ensuring that everyone is working collaboratively in a democratic manner. This LU leadership has been instrumental in ensuring that the project was executed efficiently, effectively, and in compliance with EU regulations and standards.

In conclusion, the CIDMA CBHE project has the potential to make a tremendously positive and meaningful impact in Mozambique. By providing innovative educational resources and training opportunities, the project aims to build durable capacity and promote knowledge exchange. Its ground breaking focus on spatial analysis, disaster management, and climate change studies, coupled with the use of new technological approaches, has proven highly effective.

The project's success in interconnecting educational systems and promoting exchange between open access global and local databases sets a new standard in capacity building efforts in Africa. The project has made significant strides in building the capacity of individuals and institutions in Mozambique, paving the way for the efficient management of climate-induced disasters in the region. Its positive impact will continue to be felt for years to come.

Overall, the CIDMA project sets a great example of successful capacity building, with the potential to drive positive change and promote sustainable development in Mozambique and beyond.