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SUSTENTÁVEL**

ABSTRACT BOOK



BIODIVERSITY

ORAL SESSION

0BdO1/Title: TESTING THE FUNCTIONALITY OF THE QUIRIMBAS BIOSPHERE RESERVE, NORTHERN MOZAMBIQUE

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Abstract: Biosphere Reserves involve man-nature partnerships based on the integration of biodiversity conservation into sustainable development through zoning that includes protected core areas, surrounded by transition and then followed by community development zone. This study evaluates the effectiveness of protected core areas of the Quirimbas Biosphere Reserve, using the elephant as a predictor. Elephant satellite tracking data collected between 2008 and 2009 were used. Elephant locations were classified and segmented into sex, day/night and season. These locations were overlaid on the Quirimbas National Park map containing a georeferenced protected core areas in ArcMap 10.1. A 5kmx5km grid was also superimposed onto the map, with vegetation, water, cultivated areas, villages, fires and precipitation. The efficacy of protected core areas (blocks A, B, and C) were tested as refuge areas using the χ^2 test; the fidelity of each of the seven elephants was tested using the Kernel density routine of ArcGis 10.1; and the factors that determine the movements and distribution of elephants through the Generalized Linear Model. A greater number of elephant locations were observed outside the blocks ($\chi^2 = 56.555$; $p = 0.000$), suggesting that the three blocks A, B and C are not effective refuge areas for elephant. The seven elephants have round back to their favourite spot each month. None specific factor was identified as a determinant of elephant movement and distribution (Generalized Linear Model; $F = 0.004$; $p = 0.949$). Elephants showed loyalty to certain locations, but outside blocks A, B and C and

restricted areas inside these. Apparently, the factors that determine their movements and their distribution are randomly distributed in the park. These results suggest that protected core areas of the Quirimbas Biosphere Reserve are not effective for biodiversity conservation and therefore appropriate zoning is recommended.

Key words: Quirimbas UNESCO Biosphere Reserve, protected core areas, efficacy, elephant, Mozambique.

0BdO2/ Title: CHANGES IN THE POPULATION STRUCTURE OF TERMINALIA SERICEA IN RESPONSE TO FIRE INTENSITY IN MAPUTO NATIONAL RESERVE, SOUTHERN MOZAMBIQUE

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Abstract: Fire is an essential determinant of the structure and function of savanna ecosystems. Changing climate conditions are expected to change the fire regime, increasing the dry season length and creating more frequent and intense fires. Additionally, they are expected to alter the understory microclimate, affecting the physical and chemical composition of the fuel available for ignition, and increasing burning risk. High intensity and frequent fires lead to a gradual loss of the complexity of the community structure. Therefore, assessing the changes in the structure of individual species as a function of the intensity of fire is important as fire is expected to become more frequent and more severe with warmer and drier climate conditions. Changes caused by burn intensity on the structural parameters of *Terminalia sericea* in MNR were assessed. A fire intensity gradient was created from an enclosed forest area to an open forest area and the diameter, height, and mortality of the individual species were surveyed. The results showed that fire intensity significantly affected the structure of *Terminalia sericea* (Kruskal-Wallis Test: $H = 453.0212$, $p = 0.000$ for height and $H = 399.8093$, $p = 0.000$ for diameter); the density and size of individuals declined as fire intensity increased. Mortality of individuals was positively correlated with fire intensity (Pearson's Correlation Test: $r = 0.9$, $p = 0.003$), showing that fire acts by reducing smaller individuals in areas of higher fire intensity; suppresses tolerant individuals and prevents their

recruitment into larger size classes. These results may suggest that in the Maputo National Reserve, fire is one of the factors responsible for the regression in the structure of plant communities and that in future and under the climate change, grasslands will expand largely at the expense of woodland and shrubland.

Keywords: Fire, *Terminalia sericea*, population structure, Maputo National Reserve, Mozambique.

0BdO3/Title: BIODIVERSITY AND VULNERABILITY OF MARINE AND COASTAL HABITATS – A CASE OF NORTHERN MOZAMBIQUE

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Abstract: The coastal and marine environment in Mozambique and particularly in the northern region is a main source for natural capital activities; assets derived from agriculture, fisheries, and more recently tourism, mining activities and emerging oil and gas. Both the marine and immediate coastal areas environment and seascape play a major role in sustaining community's livelihoods. This document builds on ecological and social research carried out in the northern Mozambique by local and international research institutions, universities and NGOs. We also provide an analysis of urban transformation and existing challenges of extreme events for livelihood's sustainability. Focus given to ecosystems services contribution to basic needs for wellbeing of communities in Cabo Delgado; role of critical habitats such as mangroves, coral reefs and seagrass beds and related fisheries. The Northern Mozambique Channel is a theatre for biodiversity highlight to the coral triangle, known as a world second centre for coral reef biodiversity. Quirimbas NP is a new UNESCO Heritage site. Recently discovered in the Rovuma Centre of Endemism of plants, having also unique habitat of rag forests. The Primeiras and Segundas Islands Area of Environmental Protection, yet poorly managed and being also a biodiversity sub-centre for an already threatened tree *Icuria dunensis*. A livelihoods data explorer, site specific interactive platform is presented to understand basic needs for wellbeing. Pemba and also Nacala town are experiencing rapid transformation. One dimension of vulnerability is that Pemba especially Chibuabuari, Colocolone, and Paquite town areas are prone to landslides and floods. Pemba has lost around 60% of its green

natural vegetation between 2000 and 2016. Such rapid transformation and increasing dwindling fisheries as documented and, exacerbated by climate impacts (as first floods ever hit Pemba occurred in 2007) demands, however additional marine resources management. Furthermore, we present option for maximization of opportunities, therefore reduce of risks by engaging this region in pursuing global agendas such as SDG14, the Blue Economy and embarking on wider good and smart practices as a mechanism for sustainability management of marine and coastal resources.

POSTERS SESSION

0BdP1/ Title: SPAWNING AGGREGATION OF FISH IN NORTHERN MOZAMBIQUE, CABO DELGADO

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Abstract: Some fish aggregate for spawning, experienced fishers realize where these aggregations are happening and target the spawning spots and this can further contribute to endanger the survival of these species. We studied six coastal villages in the district of Palma (Quirinde, Quiwia, Lalane and Nsangue), Mocimboa da Praia (Malinde) and Mecufi in Cabo Delgado province. The study occurred, in October 2016, June and September 2017 and July 2018 and had as objectives 1) to identify the species and sites of spawning aggregation and 2) to establish the period of spawning aggregation. Data collection involved surveys targeting the most experienced fishers to obtain information on spawning aggregation. Of the 124 fishers interviewed, 59% demonstrate knowledge of spawning aggregation. Information collected from fishers on the knowledge of species, sites and aggregation period reveal eight species that aggregate to spawn: *Leptoscarus vaigensis*, *Lethrinus harak*, *Lethrinus nebulosus*, *Lethrinus obsoletus*, *Lethrinus olivaceus*,

Plectorhinchus gaterinus, *Plectorhinchus schotaf* and *Siganus sutor*, and six locations of spawning aggregation, with only *Siganus sutor* being reported aggregating in all villages. Generally, fishers reported spawning aggregation taking place mainly in the dry season (June to October).

Keywords: Fish, spawning aggregation, fisheries, conservation, Mozambique

0BdP2/Title: DIVERSITY OF AMPHIBIANS IN CULTIVATED AND NON-CULTIVATED AREAS IN THE TARATIBU RESERVE - PNQ

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Abstract: Amphibians are important indicators of environmental quality and insect control. The identification of amphibian species and studies of their ecological particularities are decisive for the success of actions that seek to conserve biodiversity. The Quirimbas National Park (PNQ) is densely populated, the human population is randomly scattered within the park in villages and small population clusters due to the distribution of water sources and land facilities for cultivation. This region has been suffering a reduction in its vegetation cover due to the practice of agriculture, disturbing the quality and availability of habitats for refuge and reproduction of amphibians. Little attention has been paid to agroforestry systems in the maintenance of wildlife biodiversity, however few studies have reported on the diversity of amphibians in agricultural areas, and until then this is the first study reporting on amphibian diversity in the cultivated areas of Taratibu. The main objective of this work is to compare the specific richness of amphibians between cultivated and non-cultivated areas in the Taratibu-PNQ reserve. Two methods were used to collect the data, active search, trapping trap and fall. During the study, a total of 19 amphibian species were found, among them 17 in the cultivated areas and 15 in the uncultivated areas belonging to 12 genera, distributed in 10 families. The work results indicate that the practice of agriculture influences the diversity of amphibians.

Key words: Diversity, amphibians, uncultivated area, cultivated area, Taratibu - PNQ, pitfull trap and guide fence, active search.

**0BdP3/Title: ECOLOGICAL PARAMETER AND RISK FACTORS OF THE NARI
MOUNTAIN ECOSYSTEM**

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Abstract: Studies on the composition and structure of vegetation contribute to the design of an ecosystem management plan. This research consisted in describing the composition and structure of the vegetation, the level of the distribution of the species, and risk factors that affect the composition and structure of the vegetation along two bands (m2) in the mountain of Nari between 2017 and 2018. Twenty-five squares (Parcels) of 10m2 were placed in each strip, where the species was surveyed, height of each individual by species, coverage by species and risk factors by range. 21 species were registered in 621 individuals. The Shannon index (+2,905) revealed that the ecosystem is rich in diversity. The species *Parkia* sp and bambusoideae sp had heights greater than 6m. The ecological parameters showed that the Nari mountain ecosystem has coverage of more than 50% and the number of individuals in the 1st group (270 plants) is lower than the second group (351 plants). It was verified that the first range presented higher risk factors such as burning, opening of agricultural camps, cutting of wood and cuttings. It is concluded that the mountain of Nari presents a good biodiversity, high risk of disturbance, needing an ecosystem management plan given the approach of the community.

Key words: Ecological parameters, Risk factors, Nari mountain vegetation.

0BdP4/ Title: INTEGRATED MANAGEMENT OF BIOLOGICAL DATA

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Abstract: The objective of this work was to demonstrate the application of bioinformatics in the integrated management of biological data for the conservation and management of biodiversity, by means of an accessible and functional database to store, organize, retrieve and share information on the main categories of global biodiversity, which includes the specific, genetic, ecosystem diversity and ecological interactions. For the construction of this database, Filemaker Pro 15

software was used. The creation of this database was based on Darwin Core standards, which is a predefined glossary of terms, intended to facilitate the sharing of information on diversity. In addition to the flexibility in the search for information, addition, alteration, data retrieval, this database answers most of the questions asked by biologists, regarding the quantification of species and number of specimens documented in a given area, occurrence habitats, species, time of occurrence, its biology, interspecific and intraspecific ecological interactions.

0BdP5/ Title: A POLUIÇÃO MARÍTIMA POR PLÁSTICOS. SEU IMPACTO AMBIENTAL E O USO CONSCIENTE E SUSTENTÁVEL NA PRESERVAÇÃO DO MESMO

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Abstract: Maritime pollution by plastics is a real action that today is of great concern to international society, as this phenomenon causes serious damages of an environmental, economic and even social nature. From the point of view that the surface of Mozambique is 799 380 km², the coast extending from the North-South towards the Indian Ocean has a coastline of 2780 km in length, characterized by a wide diversity of marine habitats and that along the even the majority of the population is found which lives only a few kilometres from the sea. Allied to this factor and that of most of it, do not have sewage networks or waste collection system, aggravates the environmental effects of this population agglomeration. In addition, large numbers of people living in riverine areas do not exercise the basic principles of citizenship and treat coastal areas as places that do not concern them, ignoring their responsibility to keep it clean and end up depositing all types of solid waste in the coastal areas. Just to highlight, according to the report "valuing plastic" published by the United Nations in 2014 indicates that the environmental impact of plastics in the marine environment is around US \$ 13 billion, which is considered high value and according to the report could be invested we other social sectors. Therefore, this research will seek to analyse the real size of the problem highlighted, and its consequences for the marine environment. But before moving forward it will be important in the first measure to understand the problem's emergence and the problem situation these days. And will further reflect on raising awareness about the

influence of man on the marine environment and promoting the adoption of environmentally responsible behaviour.

Keywords: Pollution, Sea, Plastics and Environment.

**0BdP6/ Título: PESCA ARTESANAL DE MOLUSCOS BIVALVES E GASTRÓPODES
NA CIDADE DE PEMBA, NO NORTE DE MOÇAMBIQUE**

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0BdP7/ Title: THE USE OF SENTINEL-2A SATELLITE IMAGES IN THE SPATIAL ANALYSIS OF THE MOPANE ECOSYSTEM (COLOPHOSPERMUM MOPANE) AND THE DIFFERENT TYPES OF LAND USE AND LAND COVER IN THE MABALANE DISTRICT

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Abstract: In Mozambique, and particularly in the Mabalane District, where the mopane ecosystem predominates, one of the highest rates of deforestation in the country is due to the great pressure that the vegetation has suffered. Thus, four main factors that intensify deforestation are pointed out: subsistence agriculture, vegetable coal, timber harvesting and logging for firewood and construction poles. Therefore, its analysis with information from Remote Sensing and Geographic Information Systems (GIS) constitutes a technique of great utility for the planning and management of the orderly and rational occupation of the physical environment, evaluating and monitoring in time and in the space preservation of the natural areas of vegetation. Knowledge of land use and coverage, as well as its location and distribution in a given region, is of great importance, as it provides elements for planning the use of the environment and the extraction of natural resources. In this context, this study aimed to

analyze soil use and occupation, with emphasis on the spatial distribution of the mopane ecosystem in the Mabalane District, Gaza Province, through images of the Sentinel-2A. The map of the classes was done through supervised classification with the MaxVer algorithm and it presented an excellent evaluation with the Kappa index equal 84.8% and the results refer to the area occupied by the different forest types within the Mopane ecosystem which represent 93.0% of the total area. The Scrub class occupies the largest area with 30.0% of the total area, Closed Mopane and Open Mopane classes occupy the second and third in terms of area with 27.0 and 28.0 %, respectively, with both Mopane (closed and open) being the predominant forest species, Mecrusse Forest corresponds to 8.0% and the category of Habited area/bare soil and the Agriculture class corresponding to 4.0% and 3.0% respectively, and finally the class of Water occupying the lowest area with 0.05%.

Keywords: Remote Sensing, Geographic Information Systems, Sentinel-2A Satellite, *Colophospermum mopane* (mopane) and Land Use and Coverage.

0BdP8/ Title: DIVERSITY OF RODENTS (ORDER RODENTIA) IN DIFFERENT HABITATS OF MIOMBO FOREST IN QUIRIMBAS NATIONAL PARK

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Abstract: The aim of the study was to evaluate the specific composition of rodents in different microhabitats of Miombo forest in Taratibu, QNP. The sampling occurred during 5 months: November 2016, January, March, May, and July 2017, and were performed 960 nights of trap-nights by Sherman traps and 30 nights of photographic trapping. In this study were evaluated 4 different micro-habitats: Miombo; Miombo-Velloziace; mixed forest and riverine forest. To estimate the species richness and rodent diversity in the assessed microhabitat, were used the following indices: Margalef and Shannon, respectively. We sampled 109 specimens of rodent, that belong to four families, nine genera and 13 species. We recorded greater species richness in Miombo (1.95) and lower in riverine forest (1.47). In the Miombo were resisted a greater diversity

of species (1.5) and the Miombo-Velloziace less (1.34). The disturbed areas of Miombo and Miombo-Velloziace presented higher diversity (1.29 and 1.49, respectively) and less disturbed areas of Miombo and Miombo-Velloziace presented lower diversity (1.15 and 1.13, respectively). In species recorded in this study, two were new records for Northern Mozambique and was confirmed the occurrence of one that the IUCN considered it to be likely to occur in the area. The differences between microhabitats had no significant influence on the species richness of rodents. The disturbed areas were more diverse than the less disturbed ones

Key words: Diversity. Rodents. Habitat. Miombo. Taratibu. QNP

0BdP9/Title: DENSITY AND POPULATION STRUCTURE OF *Tridacna maxima* (RÖDING, 1798) IN PEMBA BEACHES AND VAMIZI ISLAND (QUIRIMBAS ARCHIPELAGO)

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Abstract: *Tridacna* are species of charismatic bivalves, both for their size and beauty, and for their ecological role. Due to these reasons, global trade of these species has been increasing, leading to many populations being exploited. This study was carried out to characterize the state of the *Tridacna maxima* populations in two sites in the Pemba region (Cabo Delgado) and six sites in Vamizi (Quirimbas Archipelago), subject to different levels of anthropogenic pressure and *spillover* effect. We used the active search method done by *snorkell* in Vamizi and *scuba diving* in Pemba for a period of 1h with a cover of about 5m on each side. The data collection was done without use of transects and in places with coral reefs. The individuals were identified through measured and counted morphological observations. A total of 224 individuals were sampled, of which 202 were of species *Tridacna maxima* and 22 of *Tridacna squamosa*. The statistical package *SPSS v. 17.0*, where *ANOVA* was performed to compare sizes of individuals between the zones, where there were differences among all mean sizes of individuals in different zones ($p < 0.001$). The *Bonferroni* multiple comparisons test showed that not all zones presented significant differences. In relation to abundance, differences between means are significant according

Kruskall-Wallis test. The area less impacted was one that had more individuals, both young (animals less than 10cm) as well as adults (animals more than 10cm). This can be explained by higher levels of predation in non-impacted zone. However, the non-impacted zone had more occurrence of individuals of larger sizes (above 35cm), perhaps because it is a protection zone (without fishing) and also because there is a greater abundance of predatory individuals (Pork Fish and others). The impacted zone, although not showing a greater abundance of tridacna, presented values of sizes and density above what is mentioned in literature for Indian Ocean.

Keywords: *Tridacna maxima*, structure, abundance, anthropogenic impact, Pemba and Vamizi.

0BdP10/ Title: TAXONOMIC DIVERSITY OF PLANT SPECIES FROM IBO ISLAND, NORTH OF MOZAMBIQUE

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Abstract: Ibo Island is a corollary of flora zambeziaca belonging to the northern region of Mozambique and its species are still little known due to their isolation and scarce studies in the region, the same island is a part of the new biosphere reserve, recently approved by the united nations. The present work had as aim to obtain information concerning floristic composition of Ibo Island. The data were obtained by surveying species in flowering and fruiting period, traversing a trail, using active search sampling. The qualitative parameters of the floristic composition, richness and specific diversity were obtained through the Shannon-Wiener index. Were found 125 species belonging to 98 genus and 54 botanical families. The most representative families were Fabaceae (18), Malvaceae (8), Euphorbiaceae (7), Lamiaceae (6), Moraceae (5), Commelinaceae (4) and Vitaceae (4). The other families had one to three species. The value of the Shannon-Wiener index was 3.606, revealing a high diversity in relation to the Families of the study area. The richness of species found, although high (125), still does not represent the totality of species and families occurring in the Ibo Island.

Key words: Diversity; Floristic; Taxonomy; Ibo Island.

0BdP11/ Title: FLORISTIC DIVERSITY IN MICRO-HABITAT OF INSELBERG AT 820 METERS OF ALTITUDE FROM TARATIBU NATURAL RESERVE, NORTH OF MOZAMBIQUE

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Abstract: Mozambique has in its estimative 40 million hectares (ha), or 51% of land areas, covered by native forests, mainly Miombo forests, the most predominant in the Cabo Delgado Province, contain a biological diversity in part unknown and includes the Natural Taratibu Reserve belong to the new biosphere reserve into the subtropical dry forest of the northern region of Mozambique. This study aimed to know the floristic diversity on the inselberg micro-habitat in the Taratibu Natural Reserve. Were used the transect sampling method by the active search and collected species in flowering and fruiting season. The floristic survey has so far pointed 15 species, distributed in 10 families and 10 genus The most families represented are the, Euphorbiaceae, Velloziaceae, Asphodelaceae, Moraceae and the least represented with only one species are the, Myrothamnaceae, Fabaceae, Sterculiaceae, Vitaceae, Malvaceae and Asparagaceae. The Shannon's index value was (2,211), revealing a low relative families diversity in the study area. Although the results show low diversity, do not yet to account for the totality of species that occur in the area. The sampling effort is very important for the micro-habitat characterization, which will still be carried out in this study.

Key-words: Micro-habitat. Diversity. Floristics. Inselberg. Taratibu.

0BdP12/Title: STRUCTURE AND COMPOSITION OF NATIVE TREE SPECIES IN TARATIBU IN THE QUIRIMBAS NATIONAL PARK

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Abstract: The analysis of the structure of a forest, allows deductions about the origin, ecological characteristics, dynamics and trends of the future development of the forest and fundamental information to subsidize conservation strategies. The objective of this research was to evaluate the

horizontal structure and floristic composition of a forest located in Taratibu in the Quirimbas National Park (PNQ), in the north of Mozambique. 32 plots of 50x20m were systematically allocated in the area, which the height and the diameter at breast height (measured at 1.30m of the soil) of all trees (DBH \geq 10cm).The evaluation of the floristic composition was based in the distribution of the trees, identified by species, genus and botanical families, while the forest structure comprised the analysis of phytosociological parameters, species diversity and diametric structure. In the area were identified, 772 trees belonging to 32 species, 27 genera and 11 families, and the Fabaceae family was the most dominant with 44% of the species followed by Combretaceae (13%) and Euphorbiaceae (9%). The most important species of the area according to the Important Value Index (IVI) were *Julbernardia globiflora* (19.92%), *Pteleopsis myrtifolia* (8.55%) *Burkea africana* (7.82%), *Combretum apendiculatum* (7.77%), *Diplorhynchus condylocarpon* (7.30%) and *Dalbergia melanoxylon* (7.06%).The species diversity measured by the Shannon Winner index (H ') was 1.69 and the Pileou equability was J = 0.48 being considered as low. The diametric structure followed the traditional trend of inverted “j”, however with slight variation in the 17.5 cm and 42.5 cm classes, proving that the forest structure of the Taratibu still has good ecological stability. The results obtained will serve as subsidies for new research in future conservation programs in the study area, since it is the first in the same region.

Key words: Floristic composition, horizontal structure, Miombo forest, Fabaceae.

0BdP13/Title: DIVERSITY AND DISTRIBUTION OF MEDIUM AND LARGE SIZE TERRESTRIAL WILDLIFE IN THE POMENE NATIONAL RESERVE

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Abstract: The Diversity and Distribution of Medium and Large size Terrestrial Wild animals were studied in all terrestrial habitats (Open Forest of Miombo, Dense Forest of Miombo and Grassland) of the Pomene National Reserve (PNR). The samples were collected between May and June 2018, through the direct observations made along the field strips in the 3 habitats, and through the observation of footprints and animals dung's within the 16 transects of 1000m in length and 100m

of width, randomly established in each habitat. Species dominance was calculated for each habitat; to determine the specific diversity was used the Simpson index; the similarity of species between the three habitats was determined using the Jaccard similarity index and the Quantum GIS and Google Earth program were used to map the habitats and the occurrence of the species in each habitat. In PNR were recorded 9 species of mammals of medium and large size belonging to 4 families. The family Bovidae was the family with the highest number of species. The most dominant species in all habitats were: Grey duiker (*Sylvicapra grimmia*) and Bushpig (*Potamochoerus porcus*), and the less dominant species were Steenbok (*Raphicerus campestris*) and Vervet monkey (*Cercopithecus pygerythrus*). The Open Forest of Miombo was the habitat with the highest diversity of species. The highest specific similarity was observed between Dense Forest of Miombo and the Grassland. The Open Forest of Miombo and the Grassland were the habitats that presented the highest occurrence of species and the distribution of the species in all the habitats was irregular. Information about the number of species in each habitat and species occurrence maps is very important for the implementation of Wildlife Management Plan, Habitat Management, wild life protection and Ecotourism activities in PNR.

Keywords: Diversity, Distribution, Medium and Large size Mammals.

0BdP14/ Title: CHARACTERIZATION OF BENTHIC COMMUNITIES OF BEACHES OF PEMBA, NORTH OF MOZAMBIQUE

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Abstract: This work reports the study of the intertidal benthic communities of Pemba, Northern Mozambique, based on the species composition and relative abundance (cover) of benthic organisms. Eight beaches were sampled through photo-quadrats and the analysis of the percentage coverage of organisms was performed with the program Coral Point Count with Excel extensions (CPCe). Seventy-one species of macroalgae, five of seagrass and five of corals were identified.

Coralline algae, sponges and sea urchins were also present. The results showed the organization of the beaches in two groups, one including the nearest to the urban area and under greater anthropogenic pressure and the other formed by the more distant ones. These two groups presented a Bray-Curtis average dissimilarity of 85.93%, with the highest contribution from the species *Ulva pertusa*, *Padina boryana* and *Thalassia hemprichii*, with *U. pertusa* dominating the shores near Pemba and *P. boryana* and *T. hemprichii* the distant ones. The results indicated differences in the composition of the communities of the two groups of beaches, with green macroalgae dominating the community on the urban shores and brown macroalgae and seagrass the distant ones. Urban beaches also presented lower specific richness and diversity.

Key words: Benthic community, photo-quadrats, bioindicators, disturbance

**0BdP15/Title: IMPACT OF ANTHROPOGENIC ACTIVITIES ON FOREST
STRUCTURE AND SPECIES COMPOSITION OF MIOMBO WOODLAND IN SANGA
DISTRICT, NORTHERN MOZAMBIQUE**

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Abstract: The study was carried out in Niassa province, Sanga District, Unango Administrative post. Our objectives were to assess the floristic diversity, the species composition, and stand structure of Miombo woodlands in two savanna environments. Being the first one denominated Site I (Mature forests), and Site II (Miombo woodlands during regeneration after shifting cultivation). 15 plots of 20 m x 50 m were demarcated in each Sites. All woody and regenerating individuals with DBH > = 5cm were measured and identified. Sampling adequacy was evaluated based on the rarefaction curves. The floristic variation pattern among the environments evaluated through the non-Metric Multidimensional Scaling (NMDS) ordination analysis. It was found 47 species distributed in 22 families in Site I, while in the Site II, it was found 19 species belonging to 10 families. The dominant family was Fabaceae. Shannon Diversity index and species richness were highest in old regrowth areas. The ordination analysis showed a pattern of separation between

the two conditions (old regrowth, and Miombo woodlands during regeneration after shifting cultivation), in species composition showing a clearly distinct group. The floristic and phytosociological parameters evaluated were density, dominance, frequency and importance value index (IVI). In descending order, *Brachystegia spiciformis* and *Julbernardia globiflora* presented higher IVI in the Site I. *Uapaca kirkiana* and *Diplorhynchus condylocarpon* presented highest values for this index in the Site II. The dominant species in Site II are those commonly found in these environments, and Miombo woodlands demonstrate a remarkable capacity to recover after disturbance. The areas abandoned after agriculture show that this type of land use has a major impact on the composition and structure of Miombo.

Key words: *Anthropogenic disturbances; ecological succession, African savanna.*

0BdP16/ Title: TAXONOMIC DIVERSITY AND ECOLOGICAL BEHAVIOR OF VITACEAE FAMILY SPECIES IN TARATIBU NATURAL RESERVE

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Abstract: The Taratibu Reserve belongs to the flora of Mozambique which is a corollary of the Flora Zambesiaca, but little is known in terms of living flora in Taratibu due to the scarce studies done in the region. The present work had as aim to study the taxonomic diversity and ecological behavior of the vegetal species of the vitaceae family found in the Taratibu Natural Reserve, part of new biosphere reserve of Mozambique. The data were obtained through the survey of the species in a period that lasted for 3 months at the wet season, traversing a trail using the active search sampling. The data analysis was based on a Microsoft Office Excel 2007 tool. Seventeen species of the Vitaceae family were listed. Five of the 17 species found were identified and the remaining 12 is in identifications process. The scarce information about the remaining species may be the case of new species. The genus *Ampelocissus*, *Cissus* L., *Cyphostema* and *Rhoicissus*, were identified with *Ampelocissus multistriata*, *Ampelocissus obstata*-Subs. species *Kirkiana*, *Cissus quadrangular*, *Cissus cornifolia*, *Cyphostema congestum*, *Rhoicissus tomentosae* respectively. The Vitáceas are plants with a great diversity of importance for the man, from the alimentary importance as it is the case of the grape (*Vitis vinifera*), as well the medicinal importance one as it is the case of the *Cissus verticillata* which one is popularly known like vegetal insulin and is very used in the popular medicine as anti-inflammatory, antidiabetic, among others.

Key-words: Diversity. Taxonomy. Vegetal. Taratibu.

0Bdp17/ Title: COMPOSITION AND CHARACTERIZATION OF THE MEDIUM AND LARGE WILD MAMMALS IN THE TARATIBU RESERVE, QUIRIMBAS NATIONAL PARK

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Abstract: Mammals play an important role in maintaining ecosystems, creating conditions for a local ecological balance. Conservation actions have been conducted but with levels of intervention in the ecosystems very slow, compared with the speed of extinction and reduction of this group of animals. It is in this context that this work was proposed to collect relevant scientific information from the Taratibu region, which in the future may serve as a basis for the establishment of local conservation programs. The main objective of this study was to record the occurrence of medium and large wild mammals in the Taratibu Reserve. Data collection was done using the linear transect method with a length of 2.5km and quadrants of 50mx50m in three different habitats. The method consisted of walking carefully inside the quadrant to search for traces of mammals and recording them. For each sighting, data were recorded on the traces found within the quadrant such as footprints, feces, carcasses, hairs and burrows. Of the total, 14 species belonging to 11 families were registered. The largest number of mammalian species was found in the Miombo forest and through the IUCN categories; it was possible to identify ten species of minor concern, three vulnerable species and one species threatened with extinction.

Keywords: Mammals; Taratibu Reserve; composition and characterization.

0Bdp18/ Title: SUSTAINABILITY OF THE MANGROVE FOR THE SOCIO-ECONOMIC DEVELOPMENT OF THE COASTAL COMMUNITIES: REALITIES FROM THE MECÚFI

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Abstract: This article aims at understanding how sustainability of the Mangrove can contribute to the socio-economic development of coastal communities, considering the Mecúfi case. It is based on the theoretical assumption that Mangrove ecosystem is a sensitive and critical ecosystem,

with numerous functions of direct and indirect use that has been under pressure from human activities such as the demand for firewood, charcoal and cuttings for commercialization and family consumption. From the methodological point of view, the study is a "case study" type, with a qualitative and exploratory approach, using semi-structured interviews, direct observation and documentary research. From this research, it is concluded that mangrove sustainability can contribute to socioeconomic development through the rotational cut of the mangrove for consumption, sale and construction, capture of crustaceans and fish without endangering the ecosystem and producing honey for commercialization. However, it is necessary to reinforce Environmental Education actions, encourage replanting and inspection involving the whole community.

Key words: Mangrove Sustainability; Socio-economic Development and Coastal Communities;

OBdP19/Title: EVALUATION OF THE CONSERVATION STATUS OF THE MANGROVE FOREST IN THE PERIOD 2005 - 2015 IN THE BONS SINAIS ESTUARY, ZAMBÉZIA

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Abstract: The mangrove ecosystem plays an important role in economic development, environmental protection and natural biodiversity in coastal regions. However, in recent years the mangrove in Mozambique and in particular in the Bons Sinais estuary have experienced natural pressure from the inhabitants of both sides of the estuary. On the side of the city is the destruction for the construction of dwelling and salt farm. On the Inhassunge district side there is a cut for the obtaining of construction material and a recent cut for the production of charcoal and subsequent sale in the city of Quelimane. The major problem lies not only in the decline of the mangrove forest but also in the distribution of erosion on the Quelimane district side. For an evaluation of the conservation status of this mangrove forest, images of Landsat satellites from the years 2005 to 2015 were used in the ArcMap program. Results indicate that in 2005 there were 11,743 hectares of mangrove vegetation against 11,289 ha recorded in 2015, a decrease of 454 ha (4%) lost during the 10 years. In this evaluation it is also noted that of the 5,200 ha evaluated and 2005, only 850 ha remained until the year 2015. The 454 ha lost during the 10 years were transformed into deserted zones, salt farm, and aquaculture farm and habitation

place. Calculations indicate that erosion in the Chuabo Dembe, Icidua, Gazela and Murrubune is increasing at a rate of 0.7m/yr, 9.2m/yr, 8.9m/yr and 5.7m/yr, respectively. With the urban accents in the areas of the mangroves, the habitants are vulnerable to the rise of the sea level, storm and floods. On the other hand, given the great importance of mangrove to the marine ecosystem, it is already beginning to notice the reduction of shrimp and small pelagic catches in the Bons Sinais estuary.

0BdP20/ Title: STUDY OF THE RELATIONSHIP BETWEEN THE MANGROVE COVER AND THE DISTRIBUTION OF THE CRAB OF THE GENUS UCA IN THE BONS SINAIS ESTUARY, ZAMBÉZIA PROVINCE.

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Abstract: The violin crab of genus *Uca* (Leach, 1814) is characterized the high level of sexual dimorphism and globally distributed in tropical and subtropical countries in Asia, Africa, America and Oceania. Currently, 97 species are described for genus *Uca* and several aspects such as ecology and species physiology have been described. The present study focused on the mangrove species composition and density of *Uca* crab in two areas of Bons Sinais Estuary, one with higher mangrove coverage and other with low coverage. Sampling was carried out during August-November 2017 for both mangrove and *Uca* populations. The data showed that mangrove density was higher at Ilha do Chuabo Dembe with 1800 tree/hectare and low at Inhangome with 988 trees/hectare; the same pattern was followed by *Uca* spp with high density at Ilha do Chuabo Dembe of 33.92 ind/m² while at Inhangome the density found was 21/08 ind/m². Statistical analysis showed that both sampling areas had a moderate and negative correlation between mangrove density and *Uca* crab density, which means that high density of mangrove results in low density of *Uca* crab. The intricacies of *Uca* distribution are related to the feeding behaviour of the species, as the higher density areas are generally at low tide watermark where *Uca* feed during low tide and build the holes for court and residence and middle and high tide zones. Other factors, such as sediment composition should be taken into attention to study the ecology of *Uca* spp.

Key words: Mangroves, *Uca* crab, Ecology and Conservation, Mozambique.

**0BdP21/ Title: SYSTEM FOR MONITORING MARINE TURTLES USING
UNSTRUCTURED SUPPLEMENTARY SERVICE DATA**

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Abstract: The conservation of marine biodiversity keeps ecosystems in balance and ensures the sustainable use of resources. In this context, technological resources have been used for monitoring marine species to allow biologists to obtain data in real-time. There are different mobile applications developed for data collection for monitoring purposes, but these systems are designed to be utilized only on third-generation (3G) phones or smartphones with Internet access, and in rural parts of the developing countries, Internet services and smartphones are scarce. Thus, the objective of this work is to develop a system to monitor marine turtles using Unstructured Supplementary Service Data (USSD), which users can access through basic mobile phones. The system aims to improve the data collection mechanism and enhance the effectiveness of current systems in monitoring sea turtles using any type of mobile device without Internet access. The system will be able to report information related to the biological activities of marine turtles. Also, it will be used as a platform to assist marine conservation entities to receive reports of illegal sales of sea turtles. The system can also be utilized as an educational tool for communities, providing knowledge and allowing the inclusion of communities in the process of monitoring marine turtles. Therefore, this work may contribute with information to decision-making and implementation of contingency plans for marine conservation programs.

Keywords: GSM, marine biology, marine turtles, unstructured supplementary service data (USSD)

**0BdP22/ Title: REPORT OF HUMPBACK WHALE WATCHING IN VAMIZI ISLAND,
NORTHERN MOZAMBIQUE, BEFORE, DURING AND AFTER AN EL-NINÕ YEAR**

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Abstract: Despite there are many whale watching and sighting programmes in south of Mozambique in the north of Mozambique are very few touristic places doing these programs. In Vamizi Island, located in the north of Mozambique, the program of whale watching and sighting started in 2006. From the last three years 2014, 2015 and 2016 a program of whale watching from the coast was run with trained monitors, five hours a day, all days of the week during the peak of the whale season. The objective of this study is to make a comparison of whale abundance between three years of monitoring and analyse the relationship between the water temperature and whale abundance using recorded data from monitored whale watching (2014, 2015, 2016), and Vamizi Island water temperatures from NOAA database. Our whale data observations of the three years show that fewer whales were seen during the year 2015 and 2016 compared with 2014. According to NOAA, temperatures of Vamizi Island the sea surface temperature anomalies were high in 2015 compared with the other two years (2014 and 2016). Coincidentally, according to NOAA, during our three years of whale monitoring, in 2015 Mozambican channel water was affected by “El-niño” event and has a consequence of this event the sea water temperature raised and coral bleaching happen in most of the reefs. Whale abundance was also lower during 2015, this factor lead us to correlate the high water temperature supposed caused by El ninõ event with whale abundance. Although the historical observations sighting indicate that the distribution and abundance of Humpback whales are not influenced by water depth, or sightings density, evidences form other places of the world during 2015 show that whales shorter their migration and stay in the unexpected warmer water of temperate zones instead of going to further tropical waters.

Keywords: Whales, Water temperature, Abundance, Vamizi

0BdP23/ Title: IDENTIFICATION OF THE MAIN INFECTIOUS AGENTS OF THE HUMAN URINARY TRACT BY CLASSICAL DIAGNOSTIC TECHNIQUES - NAMPULA CENTRAL HOSPITAL

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Abstract: Urinary tract infections (UTI) are caused by several bacteria, the most common of which are *Enterobacteriaceae*. This study was aimed at identifying the main infectious agents of the human urinary tract by classical diagnostic techniques in the microbiology laboratory at the Central Hospital of Nampula and to analyze the antimicrobial susceptibility profile of the most frequent pathogens. Urine samples were cultured and analyzed in the month of January to June 2017. The disk diffusion technique (Kirby - Bauer) was used for the antibiogram. During these analysis, 362 urine samples were analyzed, of which 120 (33.1%) were positive for UTI, 186 (51.4%) were negative and 56 (15.5%) were contaminated. In the positive samples 65 (54.2%) were male and 55 (45.8%) were female. A total of 13 different species of microorganisms were identified, namely: *Klebsiella pneumoniae* 54 (45%), *Escherichia coli* 40 (33.3%), *Enterococcus spp.* 6 (5%), *Enterobacter spp.* 5 (4.2%), *Enterobacter cloacae* 3 (2.5%), *Streptococcus spp.* 3 (2.5%), *Acinetobacter spp.* 2 (1.7%), *Candida albicans* 2 (1.7%), *Citrobacter diversus* 1 (0.8%), *Enterobacter agglomerans* 1 (0.8%), *Proteus spp.* 1 (0.8%), *Salmonella spp.* 1 (0.8%), *Serratia marcescens* 1 (0.8). As for the antibiogram, *Klebsiella pneumoniae* of the 12 antibiotics tested showed resistance to Ampicillin 48 (98%), Ceftazidim 43 (88%), Cotrimoxazole 48 (94%), Gentamicin 41 (87%), Ceftiaxone 41 (84%), Amoxicillin 28 (100%), Tobramycin 31 (94%) and sensitivity to Ciprofloxacin 30 (60%), Nalidixic Acid 24 (48%), Nitrofurantoin 18 (42%), Cefoxitin 37 (79%), Tetracycline 26 (58%). It was concluded that *K. pneumoniae* was the most frequent bacterium in UTI. The most frequent pathogens showed resistance to antibiotics most commonly used in clinical practice against UTI.

Keywords: Urinary tract infections, bacteria, antibiotics.

**0BdP24/ Title: DIVERSITY OF ANURPHY AMPHIBIANS: LOCALITY OF
CHIREMERA**

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Abstract: The amphibians are thin and permeable skin animals found near wetlands. They are considered to be biomarkers for sensitive to temperature changes, humidity and pollutants. The

objective of the present research was to analyze the diversity of anuran amphibians in the locality of Chiremera, using the methods of active search, visual search limited by time and collected by third parties. The locality of Chiremera is distant about 10 km from Chimoio city on the National Road Number 6 (EN6), and is located at the administrative post of Matsinho, Vanduzi district, Manica Province, where 3 data collection Areas were sampled in January to March of 2017. Were used Shannon - Wiener index of diversity expressed by the equation $H' = -\sum p_i \log p_i$. There were registered 28 individuals distributed in 7 species and grouped in 4 families. The Area with the highest diversity index was the Area 1 with the value of 1,971 Shannon index, a small artificial pond, characterized by permanent water, banks constituted predominantly by large grasses and the lowest values were found in the Area 2 with a value of 1.5546 Shannon index, a semi-permanent artificial grass, small, undergrowth, herbaceous - shrub and Area 3 with the value of 1.4591 Shannon index, an Area flooded only in the rainy period, small of predominance by vegetation little shrub around. Therefore, it was concluded that the diversity index of Shannon - Wiener of anuran amphibians in the locality of Chiremera is high and significant (H') = 3.0609, which means that the anuran amphibian community found is diverse. Having been strongly influenced by rainfall, for the months of January to May of 2017 there was high precipitation index in the region, which provides greater environmental heterogeneity, allowing feeding and reproduction of the anuran species found at the study Area.

0BdP25/Title: INFLUENCE OF MANGAL FOREST DESTRUCTION IN AQUATIC SPECIES GROWTH: CHIVEVE COASTAL CASE STUDY FOR THE PERIOD 2015 – 2017

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0BdP26/Title: SPACE-TEMPORAL DYNAMICS OF THE ZOOPLANTON COMMUNITY AT THE PEMBA BAY (MOZAMBIQUE)

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0BdP27/ Title: THREATS CAUSED BY ARTISANAL FISHING TO BIODIVERSITY AND THE SURVIVAL OF MARINE SPECIES IN ISLAND OF MOZAMBIQUE

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Abstract: The Island of Mozambique was the first capital of Mozambique and the confluence of several African, Asian and European ethnic groups and the history tells us that this place has been a very important commercial warehouse of the Arab and Portuguese shipments and a place of embarkation and disembarkation of people and various goods. Today we observe disordered and uncontrolled fishing practices by local fishermen with lack of training about the use of marine and biodiversity resources that causes the deterioration of marine biodiversity. Thus, the urgent need to raise interest in the conservation of marine biodiversity to the local people. For example, some of the threats that we find are climatic change, poor fishing habits and practices, lack of information and formation on the life cycle of marine heritage, lack of awareness of the importance of the marine heritage to biodiversity, poor standard of life and use of gas cylinders for underwater fishing. With this presentation we intend to call attention to all stakeholders, coastal ecosystem the need for urgent measures to change this behavior as well as propose possible measures like: Identification of factors influencing marine biodiversity and implementation of measures to reduce them. These measures will be conducted with methods and procedures suitable to solve these problems, under cooperation among relevant parties, Improvement of fishing practices by creating network groups of work that will endow local fishers in matters of good fishing practice for the conservation of marine biodiversity and Creation of special marine areas of conservation designed and managed by law or other effective means, aimed at conservation of marine biodiversity supporting the sound structure and function of marine ecosystem and ensuring the sustainable use of marine ecosystem services.

**0BdP28/ Title: CHARACTERIZATION OF BENTHONIC MACROINVERTEBRATES
IN MANGROVE OF PEMBA BAY, NORTHERN MOZAMBIQUE**

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**0BdP29/Title: FINANCIAL ASSESSMENT OF FOREST NATIVE TO INHAMBANE
PROVINCE**

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Abstract: The lack of information on the quantification and valuation of forest resources in Mozambique is a major problem for the economic dimension, since the goods and services that native forests offer to society are not included in the national accounts. The main objective of the research is to value the Inhambane native forest financially from wood with commercial value and carbon stocks. Data were collected from a systematic sampling. The financial value was determined by the Discounted Cash Flow Model, from the Net Present Value, both for tree species with commercial value and for the carbon stock. From the estimates, the financial value of the forest was US\$ 442,434,956.12. Of this, 97% constitutes the financial value of wood with commercial value and 3% of the carbon stock. Based on the sensitivity analysis, it was found that the increase or decrease in price has a greater influence on the final value of the forest in relation to the discount rate, both in the standing wood and in the carbon stock.

Keywords: Wood with commercial value; Carbon stock and; Financial value.

**0BdP30/ Title: STUDY OF DIFFERENT MODELS FOR ESTIMATING GENETIC
PARAMETERS FOR CORPORAL AND METABOLIC WEIGHT CHARACTERISTICS
IN BRAHMAN CATTLE BOVINE**

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Abstract: Inheritance coefficients for weaning weights (PD), first year (P365), over year (P550) and metabolic weights in the respective ages of Brahman breed born between 1994 and 2012, under three different models, were estimated. The model 1 included the direct additive genetic effect as random, in addition to the fixed effects of group of contemporaries, defined by the variables: owner, herd, breeder, herd of the breeder, sex, breeding condition, year and month of birth, year and month weighing. Model 2 comprised, in addition to the aforementioned effects, the effect of maternal permanent environment. Model 3 consisted of direct and maternal additive genetic effects and permanent maternal environment (random) and the same included in model 1 (fixed). According to the likelihood ratio test (LRT), model 3 was the most adequate to adjust the effects studied. Estimates of direct heritability were moderate to high (0.325 to 0.598), decreasing weaning at subsequent ages.

Keywords: model comparison; heritability; body weight.

CLIMATE CHANGE

ORAL SESSION

0MCO1/ Title: ROLE OF SPECIFIC MEMORY IN THE CONSTRUCTION OF A GENERAL MEMORY FOR THE PREVENTION OF EXTREME EVENTS: THE CASE OF ALTA ZAMBEZIA

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Abstract: The theory of diversity-stability applied to social systems explains that diversity of socio-ecological specific memories guarantees the general resilience as it increases the system's ability to respond to all kinds of disturbances. The reduction or loss of diverse memories can reduce the capacity to respond. As a result, some recurring events may be surprising, thus increasing the vulnerability. Socio-ecological memory is the key to the social resilience of systems because the systems can use past events to face the present, predict the future, and improve their ability to face the events. In this study, we describe the Socio-ecological memory for prevention of extreme events in the province of Zambezia, with the objective of analyzing the influence of specific memory on the social resilience of systems, the predictability of extreme events, and the adaptability of systems to extreme events. Semi-structured interviews were conducted in two communities (one after the floods of 2015: in Lugela District, located along the Licungo River Basin), and another in the buffer zone of the Gilé National Reserve. The results showed that these communities have a low resilience because of their high dependence on specific resources. Their ability to predict some events is focused on aspects of their daily lives, and recurring events such as the January 2015 floods tend to be a surprise within these communities, resulting in a low adaptability. The results suggest that communities in these areas are focused on specific aspects, which reduces the diversity of memories in the system, thus increasing their vulnerability, as suggested by the theory of diversity-stability applied to social systems.

Keywords: adaptation, general and specific memory, general and specific resilience

0MCO2/ Title: VULNERABILITY OF SEA GRASS ECOSYSTEMS TO CLIMATE CHANGE IN THE ENVIRONMENTAL PROTECTION AREA OF THE ``PRIMEIRAS E SEGUNDAS ISLANDS

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Abstract: The overarching objective of this work is to evaluate the impact of climate change on marine ecosystems by assessing the climatic vulnerability of sea grasses in the area of environmental protection of the “Primeiras e Segundas Islands”. For the accomplishment of the work, it was divided into two major approaches: the theoretical and empirical approach. In addition to this, several topics have been developed in the theoretical approach from global, regional and local climate change, depiction of sea grass biology and ecology, global distribution of sea grasses, socioeconomic importance of sea grasses as well as the main factors determining the Climate change in the marine environment: temperature, carbon dioxide, light and nutrients. For the empirical approach, 28 sampling stations were sampled, the samplings included the mapping of sea grass carpets, by using squares and dups to identify the species. Unfortunately, due to the biophysical nature of sea grass carpets (depths above 2 meters) in the “Primeiras and Segundas Archipelago”, it was not possible to use the quadrangles to determine the percentage of coverage of sea grass species as indicated in the methodology section (See section 5, on procedures), even in low tide with full moon. Within the 28 sampling stations studied, 15 are from the archipelago of the Segundas Islands, while 13 are from the archipelago of the Primeiras Islands. During the research process, seven species of sea grass were identified, such as: *Zostera capensis*, *Cymodocea serrulata*, *Halophila ovalis*, *Enhalus acoroides*, *Halodule* spp, *Thalassodendron ciliatum*, *Syringodium isoetifolium*. As for assessing the climatic vulnerability of sea grass carpets, it was found that the northern sea grass carpets (of the Segundas Islands) area aiming to become more vulnerable to extreme events than those of the Southern archipelago. The marine sea grass from the Primeiras and Segundas Islands have become vulnerable to temperature rise events in the oceans; there will also be more sensitive species than others such as *Halodule uninervis*, and less vulnerable to the rainfall events.

Keywords: Vulnerability; Sea grass; Climate changes.

OMCO3/ Title: COMBINED COOKING AND HEATING WATER STOVE “MISTO”

Authors: Edna Rabeca Albino Cavell¹; Aurélio Zefanías Chirime²; Nordino Moisés Mungoi³; Basílio Zeloso Salvador Tamele³

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Abstract: It is well known worldwide that the pressure on forest to provide fuel for cooking, space and water heating will continue leading degradation of forest resources as far as the global population increase at actual rates. Demographic forecast expect increase of number people using traditional biomass from actual 2.5 billion up to 200 million by 2030. In particular case of Mozambique, about 80% out of 27.2 million of people rely on biomass (wood and charcoal) for their energy needs. Though biomass is renewable resource and apparently available through the country, it is in risk, especially the mango grove used in coastal communities as wood, charcoal production and building house as well. Degradation of mango grove is reported to have negative impact on marine biodiversity (mainly prawn) in Zambezi, Sofala Nampula and Maputo province. Well, biomass use it is not by itself leading deforestation, in addition, the inefficient combustion technologies, such as traditional metallic cooking stoves also have its contribution on resource pressure. With regards to cooking technologies, good work was done so far worldwide, with the introduction of improved stoves. In that context, we present a charcoal stove integrating a boiler in order to make use of all generated heat during preparation of meals. The innovation to the improved stove was introduced with the main aim of reducing the charcoal expenditure. Metallic material was used for supporting structure and cooper coil revolved by clay as boiler. The tests results show good performance capable of producing 40 to 80 liters 55°C hot water, during two hours of cooking food. The heated water later can be used either for bathing or washing dishes. We believe that the technology will help in climate mitigation.

Key words: Water-heating, improved charcoal stove, climate change

0MCO4/ Title: FUTURE CLIMATE SIMULATION OF TYPHOON NO.18-2017 EVENT BY USING PSEUDO GLOBAL WARMING DYNAMICAL DOWNSCALING METHOD

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Abstract: In recent years there has been considerable attention paid to global climate change. Global climate change has the potential to cause higher evaporation rates and transport larger amounts of water vapor into the atmosphere, probably resulting in the acceleration of global hydrological and biogeochemical cycles across soil, atmosphere, and vegetation (Tatsumi et al., 2013). Therefore, it has been suggested that global warming may cause the intensification of extreme weather events, such as typhoons and severe precipitation. The intensity and frequency of extreme events might significantly increase. This increase has been linked to the greenhouse gas emissions from human activities that cause the climate to warm. For example, Wang et al., (2005) showed for the first time that over the past four decades 1965 to 2003 prevailing typhoon tracks in the Western North Pacific have shifted westward significantly; thus the East Asia has experienced increasing typhoon influence. Recently, in 2004 and 2017 typhoons hit the Japanese archipelago and, Shikoku Island was severely impacted and Ehime prefecture suffered from typhoons 0415, 0416, 0418, 0421, and 0423 in 2004; and typhoon No.18 in 2017. In particular, rainfall extreme due to typhoons 0415, 0421, and 0423 triggered many slope failures at different locations in north-east Ehime prefecture (Acharya et al., 2014). Thus, the effective risk assessment and mitigation planning, accurate knowledge of extreme climate event distributions over long periods is needed. The future prospects of climate change around the Shigenobu-river alluvial fan (Matsuyama plain) based on the RCM20 – SRES A2 scenario predictions to 2100, was investigated in the previous study by Kayaki et al., (2010). The study suggests that an average winter (October – March) precipitation will fall to approximately 80% of its current value over the next 100 years. Watanabe et al., (2010) suggests that the average monthly precipitation in summer tend to increase, whereas average precipitation in winter it decreases over Matsuyama plain. In terms of the disaster prevention, the impact of global warming on extreme events such as torrential rainfall and typhoons in summer is also one of very important issues to address. However, this has not been studied in this area. Therefore, in this study the future climate of typhoon No.18-

2017 event was investigated using the new downscaling method called PGWM (Pseudo – Global Warming Method) which is a way to downscale for a future climate using current weather data-set of the GCM (Global Circulation Model) added by the long-term mean difference between the present and the future climate projected by a GCM. For the Regional Climate Model (RCM) adopted in this thesis is the Weather Research and Forecasting (WRF version 3.5) modeling. The WRF model has been used in regional climate studies over Japan, and the studies indicated that the mesoscale numerical model (WRF) can reproduce the main features of climate in the region well (Hiroyuki et al., 2012). During this study we conducted multinested experiment for four domains with different horizontal resolutions of 30 km (D01), 7.5 km (D02), 1.875 km (D03), and 0.469 km (D04), respectively. The first and second domains (D01 and D02) were used to evaluate the impact of global warming under the RCP8.5 scenario on typhoon No.18-2017 event, while the last domain (D04) was used to investigate the ability of the WRF model compared to the observation data. The initial and lateral boundary meteorological data which was used to run the WRF model were obtained from the National Centers for Environmental Prediction (NCEP)/NCAR and it was updated every six hours. Time integration was conducted from 1800 UTC 16 September 2017 – 17:00 UTC 18 September 2017 (0300 JST 16 September 2017 – 00:00 JST 18 September 2017). The simulation result at 15 JST, 17 September 2017 were chosen as the targeted period to analyse the future climate of typhoon No.18-2017 event. The Global Precipitation Measurement (GPM) satellite's 3-D Radar data (DPR Ku Band) were used to probe the structure of rainfall of typhoon No.18-2017 compared to the simulation result in WRF. GPM is a joint mission between NASA and Japan Agency JAXA. Thereafter, Himawari Real-Time Image were used to probe the potential areas of heavy rainfall associated with deep convective clouds compared to the simulation result. The Global Climate Model (GCM) used in this thesis is the MIROC5, which stands for the Model for Interdisciplinary Research On Climate, developed on the basis of MIROC3.2 and consists of five components models, namely: sea, land, ocean, ice and river. The model developers are Center for Climate System Research (CCSR), University of Tokyo/ National Institute for Environmental Studies (NIES)/ Frontier Research Center for Global Change (FRCGC), which is based on general spectral dynamical core and includes a standard physics package Yu et al., (2013). Two kinds of dataset was used namely dataset of Automated Meteorological Data Acquisitions System (AMeDAS) stations for analysing the observational features of the typhoon No.18-2017 in Ehime prefecture and MIROC5 dataset

for future projection. We used data from MIROC5 CMIP5 model to calculate the global warming increments by subtracting means for each calendar of the years averaged over August, 2006-2015 (chosen as the present day climatology) and August, 2056 – 2065 (chosen as the future scenarios - RCP8.5). These two periods will ensure the long term signal which will be clearly distinguished from shorter-term climate variability.

Key words: Pseudo global warming method, Future climate change scenario, dynamical downscaling, WRF-ARW, Typhoon No.18-2017 event, MIROC5

POSTERS SESSION

OMCP1/ Title: ESTIMATION OF ABOVE GROUND BIOMASS AND CARBON STOCK IN MOPANE FOREST IN MAVUMBUQUE, MABALANE DISTRICT

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Abstract: The present study aimed to estimate the above ground biomass and carbon stock in the Mopane forest in Mabalane. Diameter at Breast Height (DBH) and total height (HT) were measured in all individuals with $DBH \geq 5$ cm, for 16 sample plots of 0.0625 ha. For the data set, corresponding to 44 *Colophospermum mopane* trees, destructively sampled was used to fit models. The biomass has been estimated in two components (stem and Crown). In each tree, samples of stem, thin and thick branches, and leaf samples were taken. The wet weight of the samples of each component was determined and then completely dried in the oven at 90 ° C to obtain the dry weight of each component. Based on the relation between the dry and wet weight of the samples, the total biomass of each component and of the whole tree were determined. Using the R-studio package, were adjusted Biomass Models of Brown, Kopezky-Gehrhardt, Husch, Meyer, Stoate and Schumacher-Hall). The selection of the models was based on the Akaike information criterion,

adjusted R-square, standard deviation of the residual, Furnival index, and graphical analysis of the residual. The best model was validated based on the chi-square test at 95% probability. The carbon quantity was considered to be half the biomass. Therefore, the Schumacher-Hall and Husch models showed better results in all the evaluation criteria. The fitted equations were used to estimate the estimated biomass and carbon in mopane, where has been observed 42.3326 tons/ha 21.16363 tons/ha, respectively. The amount of biomass and carbon was low, due to the characteristics of the site, and the anthropic interference from the production of charcoal.

Keywords: Biomass, carbon stock, model fit, Mopane

0MCP2/ Title: INTERNATIONAL CONFERENCE ON BIODIVERSITY, CLIMATE CHANGE AND SUSTAINABLE DEVELOPMENT

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Abstract: Droughts are a permanent threat and water scarcity is recurrent in Africa, which endangers populations and ecosystems. Weather adversities and climatic variations have a decisive effect on both animal and plant development. People and ecosystems are increasingly suffering from droughts due to a variety of reasons, related to high population growth rates, high population density, migration and unplanned urbanization, as well as environmental degradation. In addition, climate change will lead to an increase in the frequency of extreme events such as global temperature increase, precipitation decrease, sea level rise, which will affect various sectors of activity. Climate change increase the risk, intensity and duration of droughts. The drought problem, whether for present climate conditions or for future climate scenarios has captured the attention of the scientific community and government authorities. The unpredictability of drought events and the poor economic performance of African countries make it difficult to adapt, mitigate and provide support to populations. Reliable climate information can assist in monitoring adverse and beneficial climate events, allocate resources, mitigate and adapt to climate change. Drought research is necessary since knowledge of its evolution, scope and effects can facilitate the planning of various rain-dependent activities.

In Mozambique, drought often affects the central and southern regions. Its impact is further intensified by the great vulnerability of ecosystems, coupled with the high poverty of rural populations. The variability of the precipitation in the South Region of Mozambique was analyzed based on a historical series (1960 - 2004) of monthly and annual data. The analyzes performed were represented by 11 meteorological stations. The Standardized Precipitation Index (SPI) was used to assess the severity of drought.

0MCP3/ Title: ADDRESSING CLIMATE CHANGES AND FOOD SECURITY IN MOZAMBIQUE TROUGH HYDROPONIC CULTIVATION: POTENTIAL AREAS OF IMPLEMENTATION, CHALLENGES AND RESEARCH PRIORITIES

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Abstract: Horticulture is one of the potential areas for investment in Mozambique. Due to weather problems that have plagued Mozambique in recent years it is extremely important find farming techniques alternatives to feed the population and minimizing some problems caused by climate change. One of these techniques is the introduction of hydroponic cultivation in certain regions of country. This study highlighted four potential areas for implementation of hydroponic cultivation, being: High risk regions (HRR), big cities areas (BCA), mega projects implementation areas (MPA), Special areas (SA). The main cause that dictated the choice of these four areas were the vulnerability to the effects of climate change and the greater population density that is observed, which causes the scarce and greater demand of foods.

Key words: hydroponic cultivation, potential areas, Mozambique, climate change, food security

**0MCP4/Title: ADAPTATION STRATEGIES TO CLIMATE CHANGE BY FARMERS –
THE CASE OF CHOKWE IRRIGATION SCHEME**

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Abstract: Agriculture is the basic activity of the majority of the Mozambican population, with most of them living in rural areas using rudimentary technologies. The present study aimed to identify strategies of adaptation of the farmers to the climatic changes in the irrigated perimeter of Chókwe. The survey was carried out in the district of Chókwe between January and March of 2018. Two sectors of the irrigation system were included: South and North. For the data collection, a questionnaire was administered to the 74 farmers who exploit the upstream and south sectors. The data from the survey were submitted to the statistical package SPSS version 23 for processing and interpretation. The results showed that a majority of farmers (68.9%) believe that the temperature is getting higher, 20.3% believe that the temperature has dropped over the years and 10.8% did not notice these changes. Regarding precipitation, 87.8% believe that it has dropped a lot over time. Most farmers (32.5%) believe that the incidence of pests and diseases is the greatest impact of climate change, followed by low yields (28.9%). To deal with these strange events, the strategy adopted by the majority (25.1%) is crop rotation, followed by use of new varieties (19.7%) and use of certified and drought-tolerant seeds (17.2%). The use of river water, ponds, and mulching are other strategies adopted by the farmers to meet the needs of irrigation water. Therefore, farmers have some notion about climate change, although it is knowledge that needs to be improved.

**0MCP5/Title: BOTANY BIODIVERSITY AND CLIMATE CHANGE: VARIATION IN
THERAPEUTIC POTENTIAL**

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Abstract: The application of plants with therapeutic properties is one of the activities of traditional medicine practitioners handed down from generation to generation since the dawn of humanity. However, the botanical biodiversity that Mozambique has, coupled with the poor coverage of health services and the resistance of certain synthetic drugs to effervesces that have already demonstrated efficiency, contributes to the perpetuation and appreciation of home herbal medicine as a source of cure, which is often the only one due to the lack of other resources for health care, because in it, there are important sources of biologically active substances for the treatment of diseases that affect society. It was in this perspective that the present study, sought to relate the therapeutic potential of medicinal plants of Montepuez in face of climate change. Methodologically carried out a documentary survey in the meteorological station of the City of Montepuez, followed by a literary revision that served as base to support the work and interview that was directed to the practitioners of traditional medicine. The results of our study revealed that the different authors are consensual regarding the influence of biotic and abiotic factors on the production and distribution of secondary metabolites in plants. And this result allows to conclude that the differences in the therapeutic potential of plants, especially of the same species, are due to the different microclimates that predominate in Montepuez, which can reduce or increase its therapeutic potential in its adaptive process.

Key words: Botanic diversity, microclimates and therapeutic potential

0MCP6/Title: BIODIVERSITY AND CLIMATE CHANGE: LITERACY OF PRIMARY AND SECONDARY SCHOOL STUDENTS (COASTAL / INLAND, CABO DELGADO / PEMBA, MOZAMBIQUE)

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Abstract: The degradation of the environment, loss of biodiversity and climate change are some of the current issues of great concern in societies, given the environmental, social and economic

implications of this reality. Some of the major problems faced by societies will be associated with knowledge gaps, among other examples, in educational policies and environmental literacy, investment in Education and Environmental Literacy in primary and secondary education, knowledge about teachers 'and students' conceptions , knowledge about studies aimed at critical environmental literacy in general terms and what challenges they anticipate, an analysis of the content of textbooks and the place of Climate Change and biodiversity in educational policies. This work aims to evaluate the knowledge of primary and secondary school students about the conservation of biodiversity under a climate change scenario in the Northwest of Mozambique (coastal area of Pemba). A methodology of inquiry using a written questionnaire was applied, which allowed the evaluation of the cognitive knowledge in the formal, informal and attitudinal knowledge component of the students. The sample studied (61) involved students (aged 6 to 15 years old) belonging to four educational establishments located in the neighborhoods of Cimento, Paquitequete and Alto Gingone: Dom Bosco College - CDB (Private School, Full School of Paquitequete - EPCP (Escola Publica, Escola Básica, Paquitequete District), Escola Secundaria de Pemba- ESP (Public School, Secondary School, Cement District) and Maria Mazzarelo Community Secondary School - ESCMM (Community School Secondary Education in the Alto Gingone District. The students were asked about various environmental issues (Biodiversity, Planet Earth / Climate Change, Impact of Climate Change on living beings, agriculture and forests), and subsequently developed with them activities on biodiversity conservation and impacts on climate change. The results showed that the students demonstrate some Environmental Literacy, which leads the researcher to conclude that the sample presents, globally, a level of cognitive knowledge, in the knowledge component (formal and informal) and sufficient attitudinal component. Although the results were slightly similar between the studied schools, the students of the ESCMM stood out with better result in the component formal knowledge and the students of the EPCP stood out in the component informal knowledge, attitudinal and in the Environmental Literacy by global school by schools. There was a clear improvement in climatic knowledge in a school context, as well as the adoption of new pro-environmental attitudes and availability in this context.

**0MCP7/Title: PERCEPTIONS AND RATIONALITIES OF ARTISANAL FISHERMEN
ON CLIMATE CHANGE IN PEMBA, MOZAMBIQUE**

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Abstract: Climate change is changes in the state of the climate, which can be observed through changes in climate properties for several years. These changes are caused by natural and anthropic actions. Climate change has a notable effect on populations, fishing, agriculture and ecosystems. Understanding and accepting climate change is an important step towards the creation of policies and strategies to deal with the consequences of climate change. For that reason, it is important to know how fishing communities perceive, interpret and behave in relation to climate change. Surveys were conducted with fishing communities at three beaches in Pemba, namely, Marinha, Wimbe and Nanhimbe, during the months of August, September and October of 2016 in order to find out how they perceive and behave to climate changes. The Fishing communities perceive climate through the intensity and alteration of rain precipitation, how much and how often it occurs. On the other hand, they believe that God changes the environment. The fishermen don't know that their behaviour changes can help reduce climate change and global warming.

Keywords: Climate change, perception, fishermen, communities.

**0MCP8/Title: IMPROVEMENT OF ENERGY EFFICIENCY IN URBAN CENTERS
AND REDUCTION OF THE EFFECTS OF CLIMATE CHANGE**

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Abstract: The purpose of this study is to use *Improved Stoves as an Alternative in Energy Efficiency in Urban Centers and reduce the effects of Climate Change*. The general objective of the study is to Understand the use of improved stoves as an alternative to energy efficiency in

urban centers to reduce the effects of climate change, and specifically to describe the evolution of population and the use of coal in urban centers; Identify the impacts resulting from the use of coal in traditional stoves and Describe the advantages of using improved stoves for energy efficiency and reducing the effects of climate change. The qualitative study was based on a bibliographical review of contents related to the theme and observation through practical experience of the author in relation to the use of improved stoves. The urban population uses coal with less efficient stoves built without any retention and heat control techniques. Thus, there is a need to introduce improved stoves with advantages of energy efficiency, reduction of deforestation and pressure on forest exploitation, inter-household intoxication and reduction of greenhouse emissions that contribute to climate change. The inefficient use of fuel wood and charcoal through traditional stoves is a concern for those interested in sustainable use of forest resources and reducing the effects of climate change. The introduction of improved stoves in urban areas is a solution to a local problem but with a global response. Improved stoves are stoves built for efficient fuel use and can be built locally. They are aimed at replacing traditional stoves, thus helping to achieve the goals of sustainable development proposed at the United Nations Cyme on Sustainable Development.

Key words: improved stoves, energy efficiency, urban centre and climate change.

0MCP9/Title: FARMERS 'PERCEPTIONS ON CLIMATE CHANGE AND INTERVENTION STRATEGIES FOR AGROFLORESTATION SYSTEMS: A CASE STUDY (MIEZE / CABO DELGADO, MOZAMBIQUE)

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SUSTAINABLE DEVELOPMENT

ORAL SESSION

OSDO1/Title: WHEN A FISHERMEN BECAMES A SCIENTIST: SMARTPHONES TO MONITOR FISHERIES

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Abstract: In Mozambique, artisanal fishing plays an important role in the lives of fishing communities, both in economic and social terms, as an important source of food and income for communities. The collection of artisanal fishing data is carried out by technicians in printed forms. The process is time-consuming, susceptible to human errors, with consequent data loss. The study aimed at creating an application using Open Data Kit (ODK) for smartphone, to increase the speed and easiness of the process, so that it could be used by the Community Fisheries Councils (CCP). To monitor species with high ecosystem and commercial potential for the communities. The process is not yet finalized, and we work for the communities can receive the treated data from their monitoring on the same smartphone. Villages of the Northern Province (Quiwia and Quirinde) and the South (Bandar, Gimpia, Mecufi) were used. It was verified that, for the South, the predominant families were Lethrinidae, Carangidae, Eugraulidade and Scombridae, while the arts were the Line fishing, beach seine and gleaning. To the north were the Lethrinidae, Mullidae, Octopoda and Scaridae and how much the arts were speargun and line fishing. In relation to CPUE, the month of June presented higher CPUE for both regions. We can affirm that the results are consistent, and the CCPs have demonstrated continuity and quality in their samplings.

Keywords: Smartphones; ODK; artisanal fisheries; communities monitor; Cabo Delgado.

OSDO2/ Title: DEVELOPING CONSERVATION AGRICULTURE IN MAIZE – GRAIN LEGUMINOUS CULTIVATION SYSTEM FOR SMALLHOLDER FARMERS IN NIASSA, NAMPULA, ZAMBÉZIA AND INHAMBANE PROVINCES

Authors: Óscar João Chichongue, Ângelo Saimone José, Fernando João Sualei, Hélder Cauia and Cristóvão Petula

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Abstract: The present study was carried out under different agroecological conditions in Lichinga - Niassa, Mutuali - Nampula, Gurue - Zambézia and Nhacoongo - Inhambane, between the 2014/2015 and 2016/2017 agricultural campaigns, in the scope of the program for increasing agricultural productivity in Southern Africa (APPSA 2014-2018) financed by the World Bank, aiming to contribute for assuring of food and nutrition safety of smallholder families in the above mentioned provinces and improving their livelihoods through the sustainable use of soil and water. The Agronomic Stations of Mutuali and Nhacoongo are located in regions of relatively low altitude with maximum annual rainfall reaching about 800mm, while the Lichinga and Gurue Agricultural Stations are located in high zones, reaching about 1400m, with the maximum annual precipitation of 1200mm. In all the mentioned experimental fields, the precipitation is unimodal, with the rainy season running between November and April. The study compared the grain yield and biomass of maize in two agricultural systems, conventional against conservationist system, also in two subsystems, monoculture and intercropping with the following grain leguminous: cowpea beans, pigeon pea, soybeans and peanut. The study was conducted in complete and randomized blocks. The ANOVA of measured variable was performed through the GenStat 14th Edition program and the means compared by the Tukey test at 5% of significance. After 3 years of development of the study in the same plots, a better use of soil and water was observed in all agroecological regions covered by the study, through the increase of grain yield as well as biomass of maize in the conservation agriculture system plots, concretely in the intercropping subsystem compared to other plots where conventional practices took place.

Key words: maize, leguminous, conservation and conventional agriculture, intercropping and monoculture.

**OSDO3/ Title: HUNTING CHALLENGES IN THE PROL OF BIODIVERSITY AND
NATURE CONSERVATION**

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POSTER SESSION

**OSDP1/ Title: THE USE OF ARGUMENTATION IN PROMOTING ENVIRONMENTAL
AWARENESS: A METHODOLOGICAL PROPOSAL FOR ENVIRONMENTAL
EDUCATION IN CHEMISTRY TEACHING**

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Abstract: Environmental awareness is a purpose of environmental education whose success is to be desired at the level of teaching processes. The present study arose with the objective of raising the attention of Chemistry teachers in the use of argumentation as a methodological strategy that provides environmental awareness in the students. For the accomplishment of the present study a field work was developed by means of i) identification of contents of environmental education in the Chemistry Teaching Programs, ii) the application of a survey directed to six teachers and iii) of a lecture about the use of argumentation in environmental education, always crossing its realities with different theoretical perspectives, through the literary review of studies already carried out on the theme in allusion. The results of the study reveal that methodological strategies are not implemented that arouse interest in the student for the conservation of the environment due to the lack of creativity of the teachers, due to the limitation in developing activities of environmental

education in the school, since the Programs of Teaching of Chemistry contain a significant part environmental content. However, teachers consider that application of argumentation in teaching chemistry can contribute to environmental education provided they are trained by appropriate methodologies for this purpose.

Key words: Environmental Education, Methodological Strategies, Argumentation, Chemistry Teaching

OSDP2/ Title: ADJUSTING MODELS FOR ANDROSTACHYS JOHNSONII VOLUME ESTIMATION (MECRUSSE) IN MACUACUA-MANDLAKAZE DISTRICT

Authors: Alexandre Abrantes Francisco¹, Severino José Macôo², Mário Sebastião Tuzine³

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Abstract: The evaluation of the potential of a forest is one of the most important aspects in the planning of exploration and in the decision making on the sustainable use of the forest resources, in this case it is pertinent to estimate more accurately the volume of these resources. Therefore, the present study had as objective to determine the best volumetric equation for volume estimation of Mecrusse at the administrative post of Macuácuá in the district of Mandlakaze in the province of Gaza. The data for the present work were collected in the Mecrusse fragment, and simple random sampling was used for plot allocation. A pilot inventory was made composed of 31 rectangular plots with a dimension of 100 X 20 m, where in each plot the dendrometric survey of all mecrusse trees with a minimum DAP of 10 cm and a commercial height of at least 1 m was performed. With the data obtained, the diametrical distribution of the species under study was made in each plot in order to select trees for the rigorous sampling. 115 trees were selected and cubed, where it was done by non-destructive method using Criterion RD 1000. For the cubing the absolute method of Smalian was obeyed, taking absolute measurements of the base diameters, top diameter and length of each section. With these data, 6 models (Hush, Schumacher & Hall, Spurr, Spurr combined, Ogaya and Akindele) were adjusted and were validated the best, having been divided in 85% for adjustment and 15% for validation. The best model was selected by evaluating the graphical distribution of the residuals along the regression line, standard error of the absolute and percentage estimates, mean residuals, AIC and BIC information criteria. After the selection of the best model, it was validated using the chi-square test and graphical analysis. After adjusting,

the best equation was the Schumacher & Hall equation with the lowest error of absolute and percentage estimation ($S_{yx} = 0.01865$ and $S_{yx\%} = 6.44617$), lower values of AIC and BIC information criteria (-497, 42 and -487.08), presented better distribution of residues and mean residues equal to (0.00024). In the validation of the model, the equation showed satisfactory results, obtaining the t-calculated lower than the t-critical, thus confirming the use of these models. In sum, all models generated satisfactory estimates, but the Schumacher & Hall model presented superiority in relation to the others, being recommended for use.

Key words: Volume, Rigorous Cubing, Volumetric Models, Mecrusse

OSDP3/ Title: ANALYSIS OF PRODUCTION COSTS OF MAIZE AND COWPEA IN THE SYSTEMS OF CONSERVATION AND TRADITIONAL AGRICULTURE IN UNANGO – SANGA

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Abstract: Agriculture plays an important role in generating rural employment and contributes to household, national, and food security, and essentially reduces rural poverty. However, several factors limit its high yields, such as high production costs, lack of technical follow-ups, and low productivity of the crops produced by Unango producers. Rural producers in view of poor management and control pay more for the inputs needed to produce crops and receive less for the products harvested. In this situation, we analyzed the production costs of corn and bean crop of the traditional and conservation agriculture system in Unango. An assay was assembled and the completely randomized block design (DBCC) was applied and data collection was based on the total operational cost, which involves all variable costs and fixed costs in the production process. With regard to the data collection it was through participation in daily activities from the preparation of the soil to storage. In order to calculate production costs, profitability indicators were analyzed and a higher production cost was observed in the conservation agriculture system compared to the traditional agriculture system. However, the conservation agriculture system was the one that presented the highest production in relation to traditional agriculture.

Keyword: Conservation agriculture; traditional agriculture; production cost; production; profitability indicators.

OSDP4/Title: CONTROL OF *Acanthoscelides obtectus* (SAY, 1831) (COLEOPTERA: CHRYSOMELIDAE) IN BEANS WITH ESSENTIAL AND POST-INERT OILS

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Abstract: The use of essential oils of plants and inactive powders has been an alternative for the control of plague-insects of stored grains. The objective of this study was to assess the efficiency of essential oils of cloves and thyme and inactive powders on the control of *Acanthoscelides obtectus* in laboratory conditions. The biotrials were conducted in the laboratory of Insects Ecology which belongs to the Federal University of Pelotas (UFPel-RS). The extraction of the oils was executed by the hidro-distillation method in a Clevenger device, for 4 hours and the design used was the completely randomized, with five replications, in a 10x8 factorial arrangement (dozes and exposition time) with ten concentrations (20; 10; 5; 2,5; 1,75; 0,75; 0,5; 0,25 and 0,0% and Tween® 5,0%). Each replication was comprised by 10 unsexed insects of *A. obtectus*. The variables evaluated are as follows: control efficiency and CL_{50} through the Proc Probit analysis. The evaluations were carried out in 1, 2, 3, 12, 24, 48, 72 and 96 hours after the treatment. The results demonstrate that the essential oils of cloves and thyme caused 100% of mortality after 48 and 72 hours, respectively, in the 20% concentration. The CL_{50} was estimated in $30,46 \mu\text{L mL}^{-1}$ for the oil of cloves and $24,93 \mu\text{L mL}^{-1}$ for oil of thyme. In the inactive powders trial, the used design was a completely randomized in a factorial arrangement of 13x7 (inactive powders and exposition time), with five replications. The treatments consisted on three types of basalt powders (0,1; 0,3 and 0,5 mm), two types of powder of granodiorite (0,1 and 0,3 mm) and diatomaceous earth in the doses of 2 and 4 kg ton^{-1} and a control, mixed in 20 g of beans and added 10 adult insects not unsexed insects. After 3, 6, 9, 12, 18 and 21 days, the number of alive insects was observed and by the Abbott (1925) equation the efficiency of the inactive powders was calculated. The results allow to conclude that the soil of diatomaceous earth in the doses (2 and 4 kg ton^{-1}) had 100% of mortality and the powders of basalt and granodiorite had 70% efficiency on the control of *A.*

Obtectus and that the mortality of the insects was influenced by the doses and exposition time of the inactive powders. The use of essential oils of *Syzygium aromaticum* and *Thymus vulgaris* and inactive powders represent a viable alternative for use in storehouses for the integrated management of *A. obtectus*.

Key-words: Insecticide activity; Control efficiency; Alternative methods; Plagues of stored grain

**OSDP5/ Title: EVALUATION OF CHEMICAL COMPOSITION AND IN VITRO
ANTIMICROBIAL ACTIVITY OF ESSENTIAL OILS FROM AROMATIC PLANTS
HARVESTED IN THE DISTRICT OF MONTEPUEZ, CABO DELGADO**

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Abstract: The use of medicinal plants in the treatment of diseases is a practice that has been used and widely disseminated in Mozambique. Essential oils are complex mixtures of secondary metabolites isolated from various parts of plants. Due to the increased use of these aromatic compounds, researches have been developed, in addition to the development of new products. Considering the popular use of aromatic plants, the present study aimed to evaluate the antimicrobial activity and chemical composition of the essential oils of dry leaves of the species *Cymbopogon citratus*, *Lantana camara*, *Lippia javanica*, *Ocimum americanum*, *Ocimum basilicum*, *Plectranthus barbatus* and *Plectranthus sp.*, A group of widely used plants in the popular medicine of the district of Montepuez. The essential oils were extracted through hydrodistillation by Clevenger apparatus. The essential oils that had activity on the three microorganisms used were *Cymbopogon citratus*, *Lippia javanica*, *Ocimum americanum*, *Ocimum basilicum*. The dried leaf essential oils of the species were tested using the disc diffusion method and minimum inhibitory concentration (MIC) against *Staphylococcus aureus* ATCC 25923, *Escherichia coli* ATCC 25922 and *Candida albicans* ATCC 25922. The essential oils of *Cymbopogon citratus*, *Lippia javanica* were considered more sensitive to yeast testing. The detection of classes of secondary metabolites was performed by gas chromatography coupled to mass spectrometry. Of the 6 essential oils obtained, 4 presented antimicrobial activity by the disc diffusion method for all microorganisms. Samples of the essential oils also showed antimicrobial

activity in MIC determination, however, in different percentages, but in the same concentration of 50 mg/ml, in the same plant organ studied and in the test conditions. The presence of monoterpene hydrocarbons and oxygenated monoterpenes occurred in all studied plant species.

Key words: Essential oils, chemical composition, antimicrobial activity, Aromatic and medicinal plants.

OSDP6/ Title: EVALUATION OF DIFFERENT STORING TECHNOLOGIES OF MAIZE GRAINS IN CABO DELGADO

Case study: Chiure district in the regions of Namaou, Mahipaand Mahurunga

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Abstract: The study was conducted in Cabo Delgado (Chiúre) in the period of October 24 of 2015 to April 14, 2016. The completely randomized block design was used with five treatments and three replications, with the objective of evaluating different techniques of storing maize grains and specifically to quantify the post-harvest losses, comparing the incidence levels of plagues and to identify the technology which best responds to the small farmer's needs. The statistical analysis was performed in the R programming language, the studied variables were as follows: moisture percentage, post-harvest percentage losses, infestation incidence, number of grains infected by mould and germination rate. The Tukey test was used to compare the treatments means at 5%, where differences were observed, in the variable moisture percentage significant differences werenot found. After six months of storing the technologies which presented the higher post-harvest losses were: raffia sack without treatment (19.2%) and improved barn (17.4%) and the lower losses were observed in: metallic silo (2.09%), Superbag (3.3%) and raffia sack with treatment (actellic) (3.9%) being these results influenced by the insects incidence, the higher germination rates were observed in the Superbag (94.9%), metallic silo (94.5%) and raffia sack with treatment (actellic) (94.2%). This recommends the conduction of similar studies including the benefit-cost study and that the farmers should adopt the technologies such as Superbag, raffia sack with treatment (actellic) and the metallic silos as they are efficient against plagues.

Key words: Post harvest losses, conservation, infestation, Superbags

OSDP7/ Title: EVALUATION OF FRUIT FLY OCCURRENCE *Bactrocera dorsalis* (DIPTERA: TEPHRITIDAE) IN THE NORTH REGION OF MOZAMBIQUE (NIASSA)

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Abstract: The fruit-growing is of fundamental role in alimentation and human nutrition; however several limit their production and sale, the *B. dorsalis* has been the most pointed factor. Since its detection in 2007 in Cuamba, they cleared up several projects fruit export by established quarantine measures. In Niassa, there are symptoms similar to those of *B. dorsalis* and fall in amount of fruit maturing and mature. With this, we evaluated the occurrence of this plague in Lichinga City and University Campus of Unango using PET traps with methyl - eugenol and malathion to capture adults, and was conditioned fruit in the laboratory to estimate infestation index and relative abundance. Applied DCC, and through the expression $\sqrt{(x+0.5)}$ data were transformed to MAD calculation and estimation of the rate of infestation. It was observed the occurrence of plague in the two regions, with higher infestation in Unango. It was observed that the infestation index for the number of pupae/fruit and number of pupae/kg did not show statistically significant differences, guava showed lower results compared to pupae/kg of fruit compared to tongoma for both fruit tree like the ground. Determined to be 100% relative abundance of *B. dorsalis* in Unango; and 78% of *B. dorsalis* against 22 % of *C. capitata* (sort never before reported in Niassa) in fruit trees and 75% *B. dorsalis* against 25 % of *C. capitata* in the fruits of the ground in C. Lichinga. Nevertheless, free zones may be invaded by the plague due to improper transport of fruit violating quarantine measures imposed by DSV and the reduction of PIB will register-increasing levels of poverty and food and nutritional insecurity.

OSDP8/ Title: POTENTIAL OF THE MAIN SPECIES OF THE MOZAMBICAN MIOMBO FOR USE IN ENERGY PLANTATIONS

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Abstract: Plantation of forest species destined for energy contributes to reduce greenhouse gas emissions due to their importance in the capture of carbon dioxide as well as the reduction of the emission of gases by the replacement of fossil fuels. The present study aims to evaluate the potential of the Miombo species for their energy use. Five native species of Miombo, in the north of Mozambique, *Brachystegia spiciformis* and *Jubernardia globiflora* were used, with five trees per species being sampled. 2.5 cm thick discs were removed at the base (0%), 25%, 50%, 75% and 100% of the commercial height of the tree, defined to a diameter with bark of 4 cm. Physical, chemical and energy analyzes were performed. All species presented characteristics that determine quality and potential for energy use. Among the species, *Jubernardia globiflora* was the one that presented several quality characteristics for energy generation, being the most recommended for use in energy plantations.

Key words: biomass energy, quality, native species

OSDP8/Title: SOCIO-ECONOMIC IMPACT OF TOBACCO GROWING IN NIASSA PROVINCE CASE STUDY OF THE NGAUMA AND MANDIMBA DISTRICTS, NEAR THE BORDER WITH MALAWI

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Abstract: It was our general objective to address the social and economic impact of tobacco cultivation in Niassa Province, in the case of the border area with the Republic of Malawi, the Ngauma and Mandimba districts. Thus, in view of this general objective, it had the following specific objectives: - to identify the social and economic impacts of tobacco cultivation practice; describe the social and economic impacts of tobacco growing; to present the socioeconomic impact matrix of tobacco culture. It is assumed that tobacco cultivation contributes significantly to the improvement of the quality of social life (education, health and cultural exchange) and economic (improvement of housing conditions, acquisition of new instruments of work and locomotives means). However, fieldwork results indicate that the socioeconomic impacts of tobacco growing are mostly negative in communities, although it contributes to the dynamics of trade and movement of people. The study was carried out based on qualitative and quantitative research based on

bibliographical and documentary consultation, assisted by interview techniques and inquiries to communities, Education, Health personnel and representatives of the tobacco culture promoters. Several studies indicate that the basis of smoking in the world is tobacco cultivation. Although its effects are negative, where around 6 million people a year, the world's tobacco consumption has been growing (WHO, 2015); thus encouraging tobacco growers to stop tobacco production; to create Health Care Centers in the vicinity of communities practicing tobacco cultivation, in order to prevent the most prominent diseases of origin of nicotine such as lung cancer and others.

Keywords: Impact, socioeconomic, tobacco, Niassa.

OSDP9/Title: EFFECTS OF RESISTANCE OF MAIZE VARIETIES IN THE CONTROL OF THE FALL ARMYWORM (*SPODOPTERA FRUGIPERDA*), (SMITH, 1797) (LEPIDOPTERA: NOCTUIDAE) EFFECTS OF RESISTANCE OF IN UNANGO AGRO ECOLOGICAL CONDITIONS

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Abstract: corn is a crop of great socioeconomic importance at the world level, this importance is due to its nutritional qualities (Aquino *et al.*, 2013). In Mozambique, maize plays a key role in food and nutritional security. About 46% of rural households have in maize as their preferred food diet alimentar (Magaua, 2012). Among the several factors that constrain the production of this cereal in Mozambique are the pests. With the recent accidental introduction of the fall armyworm (*Spodoptera frugiperda*) in Africa, an invasive species, maize production has been seriously threatened in the country, especially on holdings where producers do not apply any method of control with the recent accidental introduction of the fall armyworm (*Spodoptera frugiperda*) in Africa, an invasive species, maize production has been seriously threatened in the country, especially in farms where farmers do not apply any method control of pest infestation. The research was conducted on the campus of the faculty of agricultural sciences of the University Lúrio. The assay was conducted using the Complete Block Design (DBCC) with three (3) blocks and Five (5) treatments (Matuba, Pris 601, PAN53, SC537 and Tsangane). With an area of 49 m² for each plot,

245 m² of floor space making a total of 273 m² for each block was used the spacing of 75cm x25cm. The experiment occupied a total area corresponding to 975m². A conventional zig-zag type sampling was used in the useful area, the variables measured responses were Infestation Index Determination, Population Density Assessment, Evaluation of Damage Caused, and Yield as a function of the varieties. According to the results obtained, the varieties had no differentiated effects on the studied variables, which means statistically that there were no significant differences between the varieties. However, in terms of resistance of the varieties under study in the control of fall armyworm (*Spodoptera frugiperda*) showed to be susceptible to the attack of the caterpillar under study. It was also observed that the attack with more intensity was in the first 30 days, and in the other days no caterpillars were observed in the plant, allowing to conclude that sowing in the early can avoid considerable losses of maize production.

Key words: Control, *Spodoptera frugiperda*, Resistance, Maize

OSDP10/Title: EFFICIENCY ANALYSIS OF DIFFERENT METHODS OF BREAK DORMANCY IN THE GERMINATION OF SEEDS OF KHAYA ANTHOTHECA (WELW.) C. DC.

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Abstract: The experiment was carried out in the greenhouse of Zambeze University (Faculty of Agricultural and Forestry Engineering) in Mocuba, with the objective of analyzing the efficiency of different methods of break dormancy in the germination of seeds of *Khaya anthotheca* (Welw.) C. DC. The rehearsal was made second a completely randomized design, with 4 treatments and 4 repetitions, where, T1 was immersion of the seed in water to room temperature for 6 hours, T2 was immersion of the seed in water to room temperature for 4 hours, T3 was immersion of the seed in water to room temperature during 2 hours and T4 was control (without any pre-treatment). The parameters in evaluation were the germination percentage, germination energy and germination velocity. Of the obtained results it was verified that, for all treatments, statistically, there was no significant difference in all appraised parameters (germination percentage,

germination energy and germination velocity). This results give an evidence that the seeds of don't want a pre-treatment for stimulate their germination and the development of the energy and velocity for the germination, however, the immersion of the seed in water to room temperature for 4 hours present best results of the germination. Using accumulated daily germination's data, a tendency of growth of the seedlings of the type Sigmoidal of Boltzmann was foreseen.

Key words: germination, pre-treatment, seeds, immersion, *Khaya anthotheca*.

OSDP11/Title: STUDY OF DIFFERENT MODELS FOR ESTIMATING GENETIC PARAMETERS FOR CORPORAL AND METABOLIC WEIGHT CHARACTERISTICS IN BRAHMAN CATTLE BOVINE

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Abstract: Inheritance coefficients for weaning weights (PD), first year (P365), over year (P550) and metabolic weights in the respective ages of Brahman breed born between 1994 and 2012, under three different models, were estimated. The model 1 included the direct additive genetic effect as random, in addition to the fixed effects of group of contemporaries, defined by the variables: owner, herd, breeder, herd of the breeder, sex, breeding condition, year and month of birth, year and month weighing. Model 2 comprised, in addition to the aforementioned effects, the effect of maternal permanent environment. Model 3 consisted of direct and maternal additive genetic effects and permanent maternal environment (random) and the same included in model 1 (fixed). According to the likelihood ratio test (LRT), model 3 was the most adequate to adjust the effects studied. Estimates of direct heritability were moderate to high (0.325 to 0.598), decreasing weaning at subsequent ages.

Key words: model comparison; heritability; body weight

**OSDP12/Title: PALYNOLOGICAL AND PHYSICO-CHEMICAL
CHARACTERIZATION OF HONEYS FROM SERRA DO BUSSACO, CENTRE
REGION OF PORTUGAL**

Authors: Marcelino Caravela¹, Miguel Vilas-Boas², Paulo Russo Almeida³ e Paulo Silveira⁴

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Abstract: On the scope of this study 10 samples of honey provided by the Beekeepers Association of the Central Coast were subjected to a palynological and physico-chemical analysis in order to valorize the honey of this mountain region. To achieve this, we started with the elaboration of a reference collection of pollen samples, including flowers potentially foraged by bees, from the study area. Afterwards, the botanical source of the honeys was inferred by counting pollen grains and honeydew elements under O.M., after applying the acetolysis method. The quality of the honey samples was also studied by analyzing several physico-chemical parameters including moisture content, color, electrical conductivity, pH, acidity, hidroxymetylfurfural content, diastase, proline, sugar profile, total phenols, reducing power and the blocking ability of free radicals (DPPH). Five of the samples were found to be of monofloral *Eucalyptus* honey, and the other five of multifloral honeys, although also including *Eucalyptus*. Also five samples were strictly of nectar honey, while the other five were of a mixture of nectar with honeydew. In terms of physico-chemical quality analysis, all the samples were found to be under the legally established limits, although a level of HMF slightly higher than the level of diastase was found in the Miro, Mata de Bussaco and Lameira de São Pedro samples, indicating a possible beginning of alteration of these samples. The lowest level of HMF was found in the Telhado sample, and the highest was found in the Lameira de São Pedro sample. The antioxidant properties were moderate in all the samples. Significant differences were found between monofloral *Eucalyptus* honeys and multifloral honey of this species among others for pH ($t=-2.314$, $p<0.05$) and maltulose ($t=-2.380$, $p<0.05$). The cluster analysis made with the physico-chemical parameters allowed to distinguish two groups, one including five monofloral samples and one multifloral (Telhado), and other group with the remaining four multifloral honeys. In the PCA, also conducted with the physico-chemical data, the axis 1 was the most relevant, splitting also the same five monofloral samples along with the multifloral sample from Telhado,

from the remaining four multifloral samples. In the PCA conducted with the pollen data, both axis were important, splitting the five monofloral samples from four of the multifloral honeys. The multifloral sample from Telhado did not group with any of the other groups of samples, due to a slightly distinct pollen composition.

Keywords: Multifloral, Eucalyptus, Physicochemical, SEM, Pollen, Bussaco

0SDP13/Title: STRUCTURAL SOLUTION FOR COASTAL EROSION CONTROL IN MURREBUÉ BEACH

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Abstract: The proximity of coastal areas to the sea gives those characteristics of vulnerability and fragility, which makes them susceptible to the effects of climate change and in particular erosion. The issues that often arise in the choice of a solution for the control of coastal erosion are related to the type of structures and materials needed to compensate the effects of climate change. This work aims to analyze the causes and propose structural solutions for the erosion control at Murrebué beach in Pemba. For this purpose a visual inspection, a photographic survey of the affected sites and a bibliographic review were performed. The study suggests that the susceptibility to cyclones, marine agitation, destruction of vegetation, dunes and sea grasses and the lack of solutions for erosion control are the potential erosion factors in the area under study. The problem can be solved by maritime structures built of concrete or stones, such as those applied in Jamaica, in Nigeria and Maputo.

Keywords: Coastal erosion control, structural solutions.

0SDP14/Title: MELLIFEROUS FLORA SURVEY AND CURRENT BEEKEEPING STAGE IN METUGE DISTRICT

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Abstract: The Metuge district has bees potential because it has several plant formations, and in general the beekeeping is still conducted through the use of rudimentary techniques where it generates low productivity of honey and the botanical origin is unknown. The aim of this work was to know the diversity of melliferous plants, its flowering seasons and the socioeconomic stage of beekeeping in the metuge district. The data collection comprised a 6-month period from January to June and the techniques used were the minimal sample area for the study of flora and the semi-structured interviews for socioeconomic data. The data was analyzed using the Microsoft Office Excel 2007 and Past 3.0 tools. Thirty - five plant species belonging to 20 botanical families with flowering peak were identified from February to May, with families with the highest number of species being Fabaceae, Asteraceae and Malvaceae. The total number of beekeepers together has a universe of 237 hives. The village of Manono does not have beehives, limiting itself to only removing the honey from the swarms installed in the burrow of the trees. The village of Nanlia presented higher value with 9,000 meticals in the sale of honey while in Manono the value was lower with around 250,00 meticals. The Metuge community uses monetary income from the sale of honey to support agriculture and family livelihoods.

Key-words: Beekeeping, Honey plant, Herbarium, Socioeconomics, Metuge.

OSDP15/Title: MANGROVE SUSTAINABILITY FOR THE SOCIO-ECONOMIC DEVELOPMENT OF THE COASTAL COMMUNITIES: THE CASE OF MECÚFI ACTUAL FACTS

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Abstract: This article aims at understanding how the Mangrove sustainability can contribute to the socio- economic development of coastal communities, considering the case of Mecúfi, based on the theoretical assumption that the ecosystem of Mangrove is sensitive and critical. With numerous functions of direct and indirect use which have suffered from human activities such as the search for firewood, charcoal and sticks for commercialization and family consumption. From the methodological point of view, this is a "case study", with a qualitative and exploratory approach, using semi-structured interviews, direct observation and documentary

research. From this research, it is concluded that mangrove sustainability can contribute to socioeconomic development through the rotational cut of the mangrove for consumption, sale and construction, capture of crustaceans and fish without endangering the ecosystem and producing honey for commercialization. However, it is necessary to reinforce Environmental Education actions, encourage replanting and inspection involving the whole community.

Key words: Mangrove Sustainability; Socio-economic Development and Coastal Communities;

PROJECTS

0PO1/ Title: MITIGATION HIERARCHY AS A FRAMEWORK TO RECONCILE BIODIVERSITY CONSERVATION AND DEVELOPMENT: THE MOZAMBICAN CONTEXT AND ACTIVITIES UNDERWAY

Authors: Costa, H.M.¹, Sidat, N.J.¹, Rainey, H.¹, Quetier, F.², von Hase, A.³, Grantham, H.¹, Nazerali, S.⁴, Nicolau, D., Chongo, J.⁵, Xavier, V.⁵, Victurine, R.¹, Bampton, J.¹

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Abstract: Over the last decade there has been a significant increase in the exploitation of natural resources in Mozambique and construction of infrastructure, which are causing negative environmental and social impacts. There is thus an urgent need to find ways to reconcile the country's economic development with the conservation of biodiversity and ecosystem services, upon which the majority of the Mozambican population is dependent. The most widely used approach at the international level to reconcile economic development with biodiversity conservation is based on the adequate application of the mitigation hierarchy, which imposes on developers the obligation to avoid and minimize impacts as a way to prevent losses of biodiversity and ecosystem services, and then to remediate those losses through, where possible, restoration of

the damaged biodiversity and, if significant but acceptable residual impacts persist, to design and implement so-called biodiversity offsets. A Roadmap for an Aggregated No Net Loss system, including Biodiversity Offsets for Mozambique has been developed in 2016 and it recommends that offsetting actions should be aggregated within clearly-underfunded Conservation Areas as a way to support its effective management and achieving the conservation objectives for which they were created. The Government of Mozambique is being supported by the COMBO project, led in Mozambique by the Wildlife Conservation Society, together with BIOFUND and the BIOFIN project, to develop a regulated mechanism to achieve No Net Loss. This intends to operationalize the above-mentioned roadmap, responding to the national legal requirements for Environmental Impact Assessment, as well as for biodiversity conservation national targets. This mechanism seeks to align national environmental licensing policies of development projects with the biodiversity conservation policy and strategy, taking into account Mozambique's international and national commitments.

0PO2/Title: ÁREAS DE CONSERVAÇÃO COMUNITÁRIA, UM BENEFÍCIO PARA AS COMUNIDADES COSTEIRAS E PARA A BIODIVERSIDADE MARINHA. O CASO DE MOCIMBOA DA PRAIA E PALMA

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0PO3/Title: THE FINANCING INVESTMENT IMPACT OF THE WORLD BANK'S INTEGRATED LANDSCAPE MANAGEMENT PORTFOLIO IN MOZAMBIQUE

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Abstract: Protecting biodiversity, enhancing ecosystem services and promoting sustainable development are critical to securing rural livelihoods and fulfilling the World Bank's twin goals

to end extreme poverty and promote shared prosperity. Recognizing the inextricable links between forests, natural resources and the value chains that depend on them (such as agriculture, timber and tourism), the World Bank's Integrated Landscape Management (ILM) Portfolio in Mozambique is using a combination of policies and practices to foster conservation, address climate change challenges, and deliver long lasting and tangible benefits to rural communities. This presentation looks at the financing investment impact of the Portfolio's biodiversity, climate change and sustainable development projects by analyzing the: i) financing investment growth trends; (ii) categories receiving investment, (iii) leveraging of financing and (iv) lessons learnt and gaps. With 11 active projects financing analytical work, on-the-ground investments, results-based finance and technical assistance (representing 1%, 77%, 17% and 5% of the budget respectively), the ILM Portfolio has leveraged over \$20 million USD to protect Mozambique's conservation areas. Growing from \$5 to \$290 million USD since 2014, the Portfolio is now benefiting over 51,800 rural households and success stories so far suggest several areas for future investments: (i) incentive matching-grants for sustainable agricultural producers; (ii) promoting Public Private Partnerships for Nature Based Tourism; (iii) introducing more efficient and sustainable fuel alternatives to recue deforestation; (iv) providing strategic technical and financial climate change assistance; (v) offering knowledge growth opportunities through exchanges with neighboring countries and trainings and mentorships for future leaders. Given the substantial positive impacts resulting from the ILM Portfolio, it is important for the Government and development partners to emphasize integrated natural resource management to enable and strengthen sustainable rural development.

OPO4/ Title: MONITORING PROGRESS TOWARDS ACHIEVING SUSTAINABLE DEVELOPMENT GOALS AND THE NATIONALLY DETERMINED CONTRIBUTIONS UNDER THE PARIS AGREEMENT

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Abstract: The year 2015 was marked by several international agreements that relate to the 2030 Sustainable Development agenda. In 2015, the United Nations General Assembly adopted the Sustainable Development Goals (SDG's). The 17 SDG's are a road map intended to guide action that balances human needs with environmental sustainability by 2030. Also, in 2015, Parties to the United Nations Framework Convention on Climate Change (UNFCCC) agreed to the Paris Agreement which marked a decisive turning point in the global response to climate change. The Nationally Determined Contributions (NDCs), under the Paris Agreement, provide an operational mechanism for countries to transition from the MDGs to the SDGs by 2030. The SDGs and the NDCs attempt to move beyond the single-goal vision of economic expansion by incorporating a multitude of other targets into a more coherent and sustainable idea of human wellbeing. They provide evidence that the climate and sustainable development agendas are no longer distinct challenges to be pursued in tandem, but rather they are integral components to achieve a low-carbon, climate-resilient future. Recognizing the extent of alignment that exists between the two agendas is a first step in understanding the benefits of approaching their implementation at national and sub-national in an integrated manner. There are substantive overlaps between SDGs and the Paris Agreement. They include: (i) global coverage (ii) synergies between climate change and development (iii) same time frame (iv) nationally determined targets (v) policy coherence and mainstreaming and (vi) national reporting. National reporting for the SDGs will commence annually in 2018; while agreement on the modalities of national reporting against the NDCs will be agreed at COP 24 in 2018. Many developing countries are already setting up monitoring, reporting and verification (MRV) systems for tracking progress towards achieving NDCs. These MRV systems should also be used to track SDG implementation. Despite these efforts, many developing countries lack the institutional capacity to monitor emissions, evaluate programs and policies, estimate emission reductions across various sources and sectors in their economies, and report this information. The monitoring and reporting of both the NDCs and the SDGs shift the domestic and international focus toward development of information-generating national systems that will provide a national picture on successes and failures of various policies and measures implemented at the domestic level. In this paper, we discuss options on how to close serious information gaps that preclude comprehensive assessment of progress towards achieving the NDCs under the Paris Agreement and also SDGs. We analyse the role of monitoring and reporting instruments in facilitating the implementation of multilateral agreements by focus on (i) benefits,

(ii) challenges and (iii) synergies of setting linked-up monitoring and reporting national systems for NDCs and SDGs.

0PO5/ Title: NutriMo - DEVELOPMENT OF HANDMADE DIETS FOR TILAPIA NUTRITION IN COMMUNITY-BASED AQUACULTURE IN MOZAMBIQUE

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Abstract: The project NutriMo aims to improve the development of sustainable aquaculture in Mozambique, namely the community-based tilapia aquaculture in interior villages of Cabo Delgado province, through a multidisciplinary approach, involving people from different areas, from Portugal and Mozambique. The inexistence of fish feed factories in Mozambique implies the importation of feed, which exponentially increases production costs and often jeopardizes the economic viability of aquaculture farms. Besides that, the underdeveloped techniques applied in community-based aquaculture, especially in inland waters, provide very low production levels, which often means that this activity does not have all the positive impact on improving the people quality of life who should have. This project aims to substantially improve the community aquaculture practiced in Mozambique inland waters, thus contributing to improving the quality of life of the villages, enabling the production of food in an efficient and sustainable way and reducing the levels of poverty in the villages of Mozambique. The approval of this project will also enable the development and expansion of existing scientific collaborations between the involved partners. We aim to enhance and strengthen the scientific skills and capacities of Mozambican undergraduate and graduated students, but also in the framework of sustainable international scientific co-operation between proponent institutions. During the project development we also aim to develop and implement an Aquaculture Master's course in UniLurio, following the same strategy employed in the UniLurio Ecology master course, where the biology department of UA contributed with the course structure and contents, which produced relevant results in the valorization and capacitation of Mozambican human resources.

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