

CABO DELGADO 2015: GROWING SMART

Proposal for a scientific research and cooperation project for Cabo Delgado – Mozambique

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Abstract

Il progetto promuove un inquadramento multidisciplinare, cooperativo e inclusivo per lo sviluppo urbano sostenibile della Regione di Cabo Delgado in Mozambico. Promuovere una crescita intelligente per la regione costiera tra Pemba e Palma richiede un'interpretazione delle aspettative relative allo sviluppo del settore energetico e all'aumento del settore del turismo. Altresì, le condizioni ambientali fragili richiedono la definizione di un quadro strategico globale e strumenti di pianificazione - progettazione innovativi. L'integrazione tra i settori produttivo, trasformativo e le funzioni di distribuzione e di scambio (agro-alimentare ed energia) in un nuovo sistema metropolitano tra Palma e Pemba obbliga a ripensare l'identità dello spazio fisico locale, l'inclusione globale tra economia rurale e urbana, la riduzione e la riconversione del dispendio di energia. Prendendo le mosse da un'analisi approfondita della regione alla scala metropolitana, urbana e locale, il progetto produrrà una visione territoriale per un auto-sostentamento energetico legato alla conservazione di una identità culturale e storica comune.

Sottotema di riferimento: a

Parole chiave : green-grey infrastructure, gradiente di formalità, metabolismo urbano, Reticular Matrix Planning

The background to the action. The general strategic framework: a territorial vision

In Cabo Delgado, Mozambique north coast (1.600 km away from Maputo and 600 from Dar es Salaam), very important Gas deposits have recently been discovered.



Figura 1 Ortiz Plan Proposal for Capo Delgado.

The potential for economic and social development must be well exploited: three areas for strategic effort have been suggested to benefit from Energy inputs: Agro-food development, Industrial enterprise and

Tourism services. They have to be made compatible in environmental and territorial terms to reach sustainability.

Cabo Delgado coast north of Pemba, up to Palma and beyond the Tanzania border, has a very characteristic wavy coastline protected from rough sea by a parallel set of islands: a peculiar ecosystem with enormous tourist potential. Environment, Tourism and Gas extraction have to be made compatible in the coastline. Inland has to provide for the necessary infrastructures to support capital investment in industry as well as for agro-alimentary production and food processing.

The territorial structure, then, takes form under related parallel gradient lines that work together in a social and productive mechanism. Development might start from the specific points of Palma and Pemba but a clear vision of the overall structure will allow the development of other potential urban settlements, productive and tourist locations in a sustainable long-term framework (Fig.1).

The fostering of a smart growth for the coastal region between Pemba and Palma requires innovative interpretation and planning-designing tools. The integration between the productive, transformative, exchange and distribution functions (agro-alimentary and energy) into a new metropolitan system between Palma and Pemba requires the rethinking of local identity and global inclusion between rural and urban economy, reducing and reconvertng the expenditure of energy.

Taking the move from an in-depth analysis of the region at the metropolitan-urban-local scale the previous research had produced a territorial vision for the energetic self-sustainment with the preservation of a common cultural and historical identity. The research in fact outlined strategies of integrated planning, capable of positively directing the socio-economic impact and in parallel aimed at tailoring specific focus-projects in cooperation with involved stakeholders.

The planning of specific points catalysing urban functions and modifying the articulation of the city structure in relation to the geography and its economic structural data is essential to achieve the purpose of delineating a network of the two cities and their territory. Growth is analysed in relation to: the ground (geography-geology-uses), pre-existence (history) and resources (environmental – energetic – economic), from a metropolitan scale (large) to an urban scale (medium) until a local small one, in relation to the metabolic operations of maintenance-substitution-transformation.

The project involves a plurality of issues: spatial, environmental, and energetic as related to economic efficiency, management and governance. In particular the social, cultural, welfare and wellness issues will be considered.

The objectives of the action

The project promotes a multidisciplinary, cooperative and inclusive framework for the sustainable urban growth of the Cabo Delgado Region, in particular related to Pemba and Palma, with a long-term cultural programme with research and education activities, events, workshops, web 2.0 interaction and communication in Italy and Mozambique before, during and after the CABO DELGADO 2015: GROWING SMART Project. Inside the Politecnico di Milano we have started a PhD Laboratory and some theses about Cabo Delgado Region, trying to focus the future physical transformation of the Region and its effect on the society, especially on the most vulnerable population groups. Therefore, the expectations related to the development of the energy industry, the rising of the tourism sector, the fragile environmental conditions,

require the definition of an overall strategic framework able to guide civil society networks and local authorities associations to promote economic redistribution, consensus building and a fair development.

In particular, as far as the fragile environmental conditions and their effect on local population are concerned, we have to consider that vulnerability is made of three components: exposure, sensitivity and the capacity to adapt (McCarthy, Canziani, Leary, Dokken, White, 2001). In Northern Mozambique exposure is high because of its tropical climate and sensitivity due to rain-fed agriculture can't be soothed unless presently unaffordable infrastructures are realized. Therefore an adaptive strategy building upon traditional coping mechanisms that are usually erosive is the only way to overcome vulnerability. Among these coping mechanisms, the most detrimental one affects the poorest farmers who are employed as informal labourers by the well-off group during the peak agricultural season, thus failing to complete agricultural tasks on their own farms in time and entering vicious cycles, which lead them into chronic poverty traps.

The equity and sustainability of the regional growth, then, has to be developed through spatial, environmental, cultural, energetic, productive investments for an elevated quality of life, accessibility and economical resilience. The development of the new urban structure that involves the rural territories should be supported, implemented and communicated by Non-State-Actors (NSA) or Local Authorities (LA), in close cooperation with the local communities. These have to get aware and empowered, so to be able to manage the working range of the new urban reality, through support to advocacy, planning, implementation and/or monitoring and evaluation of nutrition and social protection programmes. Certainly, new kinds of technicians and decision makers have to be trained to conceive, built and manage the cultural gap that will permit to develop a new idea of *desakota city* (Shane, 2011) in the countries where gas or oil energy is located. So vocational education and training (VET) courses in co-share with the local Universities, Institutions, NSA and stakeholders have to be organized, strengthening links between the informal economy and formal VET institutions (e.g. recognition of qualifications and skills acquired outside formal institutions); strengthening the organizational capacity of informal economic operators in rural areas through cooperatives and associations development. They will spread the new urban concept to support the enhancement of livelihoods of people dependent on the informal economy, particularly in rural areas, and the social inclusion of vulnerable and marginalised groups. A huge program, related to the healthcare for wellness, will improve resilience and greater equity for marginalised groups (i.e. women, elderly people, people with disabilities, children and migrants).

Due to the energy's deposit discover, we imagine that there will be a transformation of areas, now rural, in peri-urban ones. This will involve the development of agricultural activities that will meet the increasing needs of the urban conglomerate, in terms of demand for food. Our vision is that the activities can be developed in an environmentally sustainable way, combining low impact on ecosystems with reduced emissions and, at the same time, with increased food production.

The *desakota city* concept is particularly fitting for addressing this issue, which is common to the majority of African cities as far as the lack of integration between the urban and rural areas is concerned. Indeed, since the countryside does not provide yields high enough to feed an increasingly large urban population and at the same time cities characterized by a high density do not allow inhabitants to grow crops in their own plots, urban areas are more and more dependent on expensive imported food rather than on cheaper staples coming from their region (Garvelink & Wedding, 2013). This dependency exposes the urban dwellers to major fluctuations in global food markets, thus worsening their already weak purchasing power due to the lack of employment in a context crowded with unskilled labour coming from rural areas (Maxwell, 1998). As a consequence, while in the countryside the affected dimension of food security is availability, i.e. the physical access to food, in cities the concern is about accessibility, i.e. the economic access to food. In order to overcome the present situation, we propose a model of settlement following a *desakota* scheme where urban areas are alternated with agricultural land feeding the city inhabitants. This proposal is extremely consistent with the dynamics already activated by the local population dealing with the inaccessibility to the formal market by engaging with the informal food sector, which is defined by FAO as a series of activities ranging from urban and peri-urban food production to retail sale of fresh or prepared products, as well as catering and transport. In order to foster these dynamics, the *desakota* model prevents the city from expanding following dense patterns so that land available for agriculture is preserved. However, the informal sector must be improved since the activities mentioned above are carried out by the single producer who can't consequently attend to each one continuously and in a proper manner. Discontinuity in delivering the important agricultural functions to the city is also due to the shifting boundary between household and market production, since food is firstly produced to be

consumed by the household members and only in case of surplus to be sold in the informal market (Floro & Swain, 2010). For these reasons, the strengthening of the informal food sector must be promoted firstly by improving agricultural yields and reducing the risks of crop failures, and secondly by distributing the different activities of the sector among different specialized actors who have to be taught how to carry out their specific task and how to coordinate among them in a sort of food supply chain. Training courses organized to get this goal would really improve the livelihoods of people engaged in the informal sector and, since the food sector is characterized by a predominant presence of women, they would be also targeted towards a category that is presently marginalized.

While in the short term the strategy will be focused at soothing the price side of economic inaccessibility, in the long term the question of unemployment will be managed through the settlement of industrial activities following an axis parallel to the coast. Factories will be devoted to the transformation of the agricultural produce to export products characterized by a high value added. Nevertheless, in order to provide the industrial sector with raw material, rural areas should produce a surplus, while at the moment they can't even manage to sustain their own population. Low levels of inputs, poor mechanization and externalities such as irregular climatic conditions, which will even worsen in the next future, are all reasons for the depressed food production performance. Since these characteristics of Mozambican agriculture can't be changed unless infrastructures and access to credit are provided through presently unaffordable capital-intensive operations, some free interventions fostering the traditional knowledge by introducing principles from conservative agriculture are considered to be the most viable proposal in the short term. Mixed cropping, cultivation of secondary crops and intercropping are all practices, which are not capital intensive and only concern the learning of smarter cropping patterns. New patterns can be designed by exploiting seasonality in order to make the present agricultural calendar diluted and so able to spread risks and to distribute agricultural tasks throughout the year, thus allowing the poorest farmers who are employed as informal labourers by the well-off group during the peak agricultural season to attend also to their farm by choosing crops typical of a different period in relation to the ones cultivated by the well-off group. The adoption of this strategy needs coordination among actors through rural producer organizations, thus fostering the social capital within the province. Training courses to teach the different requirements of different crops and their relationship with the climatic parameters of different areas, as well as practices related to conservative agriculture, are needed.

However, In our project this improvement, which will positively affect livelihoods also independently, is only the first step of a 'twin track approach' which will provide some basis for a sustained economic growth in the second step, when the investments by companies coming to exploit mineral resources are expected. Indeed, in order to make the local population take advantage of the future economic dynamics, a fertile substratum must be afforded not to waste the countervailing works companies are obliged to perform. We aim to achieve an adaptive system exploiting the given conditions and characterized by positive feedbacks between the rural and urban informal sectors integrated into the future *desakota city* so that, when private investors will come, capital intensive initiatives will meet an economic and social environment suitable for making them take root, thus realizing an inventive system able to intentionally change the territory which will finally grow besides the restrictions of the given conditions.

Since the strategy is chronologically twofold, the matching of the different temporal horizons is a pressing issue. Indeed, the present occupation of the territory is based on microcodes related to local relationships between the villages and their agricultural areas (Fig.2) as described by Caniggia and Maffei in *Lettura dell'Edilizia di Base* (1979). This way of settling in the territory could be preserved in the first phase related to small-scale interventions and introduction of practices but would be inconsistent with the second phase as it lacks the metropolitan dimension required by the overall social and productive mechanism made of parallel gradient lines based on the transformative function. Nevertheless, a pre-ordained master plan imposing a future scenario would not withstand the dynamics of informality. Therefore we propose to tap into the logic of the present microcodes rather than to oppose them and to consider the territorial matrix in figure 1 not only as the final purpose, but also as a tool working in the way of a pre-emptive armature (Gouverneur, 2013) which can accommodate the self-organizing system of the first phase in the semi-rural megablocks of the *desakota city* without undermining the realization of the long-term vision.

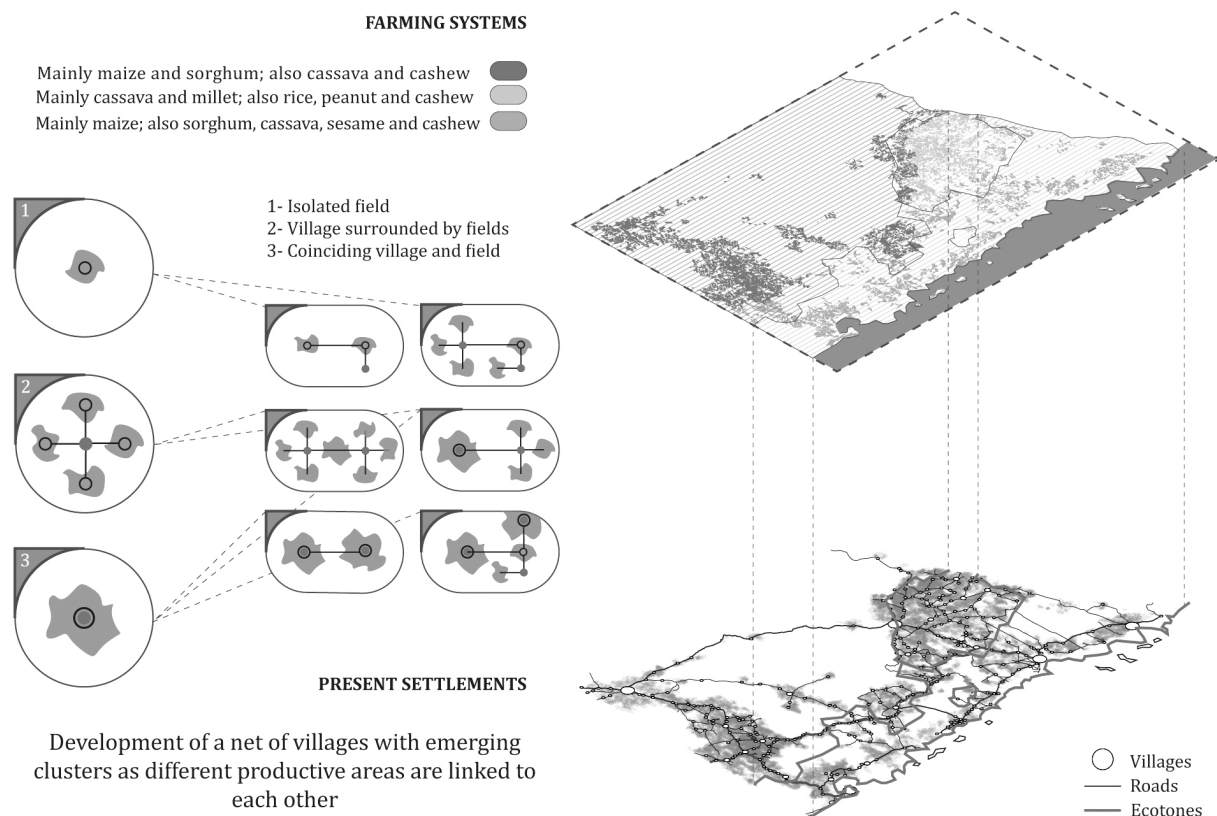


Figura 2 Present microcodes connecting villages to agricultural areas and among each other according to local topological and environmental conditions. The result of this bottom-up process is a field (Allen, 1997) characterized by intricate local connections but lacking the overarching schema necessary for future growth as proposed by Ortiz.

This context fits perfectly in the priorities identified in the planning documents of the target country (Mozambique): Action Plan (PARPA II, 2006-2009), Sectorial Plan PROAGRI (2009) and Focal Sector II of the Country Strategy Paper (2008-2013). We have to take into account, share and define within the local Institutions and communities many issues to get this goal:

- _ architecture: gradient formality, new architectonic and urban typologies;
- _ mobility and urban planning: setting the armatures for a smart growth;
- _ energy and environment: energy industry and energy accessibility for a fair development;
- _ agro-food economical system: water capital protection for landscape economical and ecological robustness;
- _ new cartography and media for education: feeding knowledge through interactive and implemented new media.

The results of that upgrading of knowledge for the local communities will be:

1) Development of agro-production chain energetically autonomous or able to provide, as independently as possible, for their energy needs. This is particularly important where the "ordinary" supply of energy is too expensive, not so profitable and sustainable poorly. ("Energy Security in Mozambique" (2010) by IISD -International Institute for Sustainable Development).

2) Development of autonomous irrigation systems suitable and achievable in a rural or semi-rural environment, which allow the reuse of grey water on a small scale, so as to ensure a minimum continuous irrigation even in times of emergency. Such action is needed to bring the agricultural sectors as independent as possible from the annual climatic fluctuations that characterize the project area (EuropeAid - document on the "Increased Food Security in Mozambique"; FAO and the National Rural Water Supply Program (PRONASAR) of Mozambique).

3) Plans for forest management and restoration of local biomass, where biomass derived from agricultural waste is not sufficient to the needs of the activity.

4) Activation of systems of energy production from renewable sources, where the energy requirements make this necessary. This type of intervention is necessary, for example, for agricultural sectors of larger dimensions, which have to meet the needs of large communities. ("Energy Security in Mozambique" (2010) by IISD -International Institute for Sustainable Development).

Finally, through the Matrix model (Ortiz, 2014), we want to react to a common "sustainable" model of huge international companies to conceive and build a new city. Therefore we have to consider what time is peculiar to both developing models and what size is optimal for each of them. Besides, our focus is how to support the local people and economies in the transformation of a territory, when a new energy deposit is founded and when a new infrastructure or settlement has to be built; but in particular, we are reaching what we NOT have to break if we do not want to destroy a kind of sustainability that the local citizens have in any case attained by themselves.

So, in the transformation we have to strengthen how the inhabitants can participate and share their growth movement: we have to find, so, the interchange and densification places of the new scale where to introduce the development. So that, choosing the Ortiz Matrix model, our objectives are the possibility of an evolution of the local model of urbanity, and mostly, the possible and realistic growth, I mean, the transformation of the regional and local models. For Cabo Delgado Region project our tools are a new mapping project through a new hybrid mapping, and the use of specific computational tools, which can help us to build a series of topological models that describe and bring into connection the main mechanisms that generate the physical space, simulating an on-going reality. Following this methodology, it is possible to obtain, through a critical reading of the pre-configured scenarios, forecasts and models of sustainable development that is characterized by a close link with the physical and cultural context.

The virtual environments and metropolitan management. The cartography tools for social interaction and cooperation

One of the problems that we face when we would apply our research to the developing countries is the lack of maps. So, we want to be able to reach the territory's information through implementable open source maps. Our research aims at reaching a full mapping of territories through the integration between the dimensional scales and the building / coding of a meta-data repository that connects actions to spaces, multiplies the tools available to researchers and creates an observatory equipped with updated datasets (Fig. 3). Our maps are almost able to report the real-time social and urban areas changes, and are capable to act as an actor in the participatory processes and to build new aesthetics.

The cartography concerned the use of devices and media that refer to the so-called per-formative maps, where the spatial practices, the per-formative actions and the digital essences are represented. The last ones, in particular, are constructed from digital codes that process the personal data of our technology and derive information from traditional media.

Today the mapping process is based on the digital exploration: geo-spatial information generated through computational methods of knowledge construction are represented with the design of interfaces for geo-visualization, which are developed from the principles of cognitive/usability. The generation of virtual environments (VEs), which follow the rules of the VISC (visualization in scientific computing), activates the control mechanisms of mental representation. The use of dynamic interfaces is an innovation in the field of the cartography tools. The new interfaces are constituted by high interactivity and animation in a virtual space with four dimensions: an interactive model designed with a computer language code that represents a new way of understanding a territory. The information displayed as space-time statistical variations are adaptable to technological devices from the personal computer to the immersive hardware. Every display model requires a specific interface with semantics designed for age, gender, culture and individual characteristics of users.

The theory-driven cognitive research in a geospatial context refers to studies that seek to understand how humans create and utilize mental representations of the Earth's environment, whether obtained via maps or by navigating through the environment. The devices of personal technology establish new common grounds for exploration and geo-visualization methods that explore geospatial data where you show hidden patterns and relationships in space and / or time.

Certainly, not only a devices / protocols production data have undergone an intense transformation, but a significant transformation has taken place in the methods of reading acquisitions and sharing of geographic information. Geographic analysis and statistical processing of data, thus, help to make

updatable, by using cartographic representations, the spatial, social and political transformations of our time. Therefore, it is possible to work on the development of technological applications that involve the construction of appropriate arrangements for the representation and display of information in each field of analysis, according to different cultural awareness and competence. An interpretive tool that can be made through statistical values, the mechanical processing on a geographical basis and the sustainability of the settlements of the human habitat can be developed.

The cartography obtained by this process is based on exploring digital data, must be completed and corrected through the direct survey of the territories subject of interest, drawing on the expertise of researchers trained on site. The professionals needed to complete and update the database will have to make an accurate geographical relief, knowing how to collect the data of the social geo-located transformations, to process the results and to use computer languages to update the media periodically. The result of that upgrading of knowledge about own developing territories for the local communities is obvious.

The broad timeframe for the action

The proposal wants to apply the planning and architectural concept of the new urban reality to the Capo Delgado region territory within the communities that live there. In fact we want to avoid the imposition of a standard “so named sustainable” city as usually happens in similar cases. Therefore, we need to share and to communicate the value of the new cultural vision through events and communication: the new idea of *desakota city*.

It's necessary to face the superimposed transformation of the region due to the deposit of energy discovered. Exhibitions or events will be organized and a web 2.0 branding identity will be set to start a viral communication and interaction campaign through the new media.

We aim to organize with the local technicians some training courses to produce a cartography through open source sites, at the regional and local scale. This is mandatory to define the guide lines for the new urban developments and to define the guide lines for the new architectural construction.

We also think that is important to organize training courses on healthcare (epidemiology) and wellness, for the women improvement. Finally we would involve Italian and Mozambique stakeholders operating in the context.

I mean, that the communication issue, here, is strategic and *fortissimo*. We hope to foster, also, the possibility for exhibition and diffusion of the research results in the Expo 2015 Mozambique pavilion. For this aim a project for the exhibition could be provided with a significant use of new media technologies in accordance with the communication strategy. An international symposium will be organized to present contents, to implement the direct involvement of the stakeholders and sponsors and to proceed to the start-up phase for specific focused sub-projects, strengthening of the already active communication strategy.

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