

Monitoring of urban growth and its related environmental impacts: Niamey case study

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The present contribution is about a preliminary study of the evolution of Niamey city (Niger) during last decades. Such research is part of an UNICOO project (funded by the University of Turin) and connected to the Edulink Cooperation Project (R.U.S.S.A.D.E.), a multidisciplinary project between Italy, Niger, Burkina Faso and Tchad funded on ACP- EU cooperation program in Higher Education.

Recent advances in remote sensing, both in satellite hardware technology (i.e. image availability) and image processing algorithm development, provide opportunities for collection and analysis of multitemporal information on urban form and size that can be useful for policy and planning. In spite of these developments, there are also limitations to remote sensing and its application in practice. Some opportunities for, and limitations on, monitoring urban growth using remote sensing data are shown in the present contribution; moreover examples of environmental impacts of urban growth, as monitored with remote sensing, are provided.

Niamey is the capital of Niger and is the first city in the country in size and economic importance. Its population increased gradually, from about 3,000 units in 1930 to about 30,000 in 1960, rising to 250,000 in 1980 and, according to estimates, to 800,000 units in 2000.

Its patterns of population distribution, livelihoods, and its dominant role within the national economy of Niger make it a good representative case study for West Africa. This case study will consider the recent historical context of continued urban growth and will assess potential future impacts of settlement patterns.

The rapid growth of Niamey in the last decades brought relative prosperity but it certainly affected patterns of land use within the city and the emerging urban system.

After a preliminary sketch of the georesources in the city (qualitative and quantitative characterization of the surface water and groundwater, and of aggregates), an analyses of the urban growth and the evolution of the city using remote sensing data are reported.

Moreover the presence of quarries, using satellite images, was highlighted. Indeed, the important enlargement of the city is certainly connected to a growing use of aggregates for construction. To plan a correct building and infrastructure activities, a survey about aggregate production and needs, and about the potential production on recycled aggregates from demolition and excavation activities, is necessary. At last, quarries enlargement ,during the decades, and, eventually, the evolution of quarries in landfills (controlled or not) are evaluated using remote sensing data.

The results of this study are of interest for the identification of the areas most likely subjected to contamination, due to waste erroneous management, of soils and water (surface water and groundwater). Moreover, all the information arising from the present work are useful for local decision makers to enhance Niamey georesources management.