

Floods and related Impacts in Niger in the last twenty years (1998-2017) based of the ANADIA Niger Flood database.

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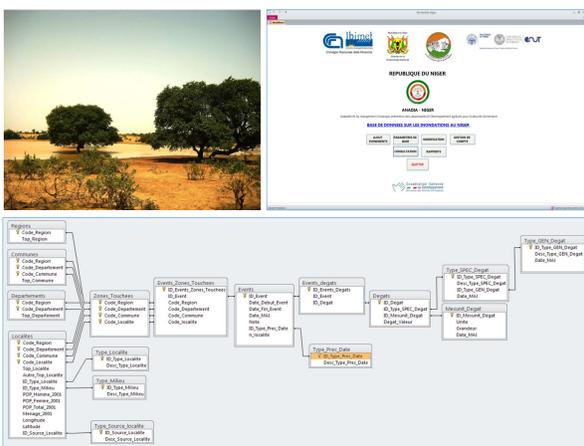
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THE ANADIA PROJECT

ANADIA is a project born from the partnership between the National Directorate of Meteorology (DMN) and the Institute of Biometeorology (IBIMET) of the National Research Council (CNR) of Italy and the Interuniversity Department of Science, Project and Policies territory (DIST) of the Polytechnic of Turin. ANADIA Niger is implemented thanks to a co-funding of the Italian Agency for Development Cooperation (AICS). The partners concerned at the national level are CC/SAP-PC (Early Warning System), DH (Directorate of Hydraulics), DS (Directorate of Agricultural Statistics), CNEDD (National Council for the Environment and Sustainable Development) and the other members of the Interdisciplinary Working Group (GTI), coordinated by the DMN.

ANADIA Niger is implemented through a programme of capacity building adapted to different levels - from the national to the local - and through a continuous exchange mechanism which allows the training of trainers gradually extending the number of beneficiaries. The theoretical training is accompanied by case studies at regional and local level in order to refine the methodological and analytical tools.

ANADIA Niger has the aim to contribute to the development of sustainable agriculture, through the adaptation of production systems to climate change, to render them less vulnerable to extreme events such as floods and droughts, in order to support food security.



The ANADIA Niger Flood database

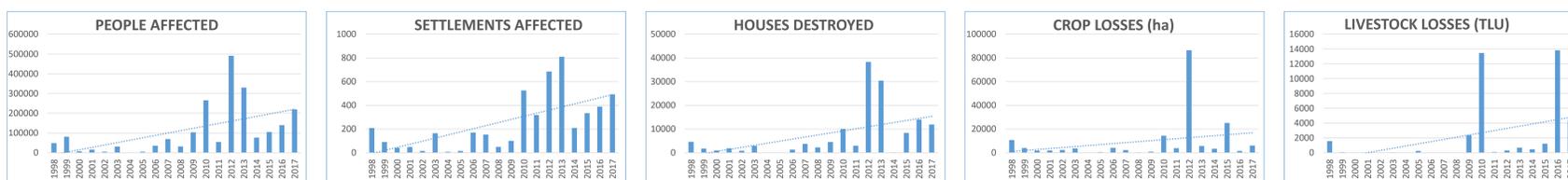
Since 1998, the CC/SAP-PC has collected flood data recording affected settlements and people, flood dates and related damage. Since 2014, between the framework of the ANADIA Niger Project, a specific relational database, called the ANADIA Niger floods database has been developed in order to store data in digital format and allow the assessment of the impacts of floods. The information recorded includes flooding dates, settlements involved, people affected, human losses, crop and livestock losses as well as other occasional or heterogeneously-quantified damage to equipment, public facilities (e.g., hospitals, schools) and infrastructure (transport facilities such as roads, bridges). No information is provided concerning causes, flood types and size of flooded areas.

Flood data are yearly collected at municipality level by a dense local network of observatories (Observatoires de Suivi de la Vulnérabilité) and therefore the data available from the ANADIA Niger Flood database are much more precise and complete than those derived from media sources or global disasters databases, especially for small events concerning remote areas.

Currently, Niger flood data are stored in a stand-alone relational database. Given the value of these data and the importance of sharing them within the scientific community, a new open-source based web version is planned in the framework of the second phase of the ANADIA Project. This tool will allow remote access, data and map visualization and data sharing.

Multi-scale Analysis of flood impacts in the 1998-2017

NATIONAL LEVEL



Damage at national level during the 1998-2017 period.

A total of more than 2,100,000 people and around 4,800 localities were affected by floods in the investigated period with more than 140,000 houses destroyed and losses of around 180,000 ha of crops and 38,000 TLU of livestock. A strong increase in the number of affected localities, population and destroyed houses is evident during the period 1998-2017. The trend shows a not unidirectional increase; most of the damage are concentrated in the 2010-2017 period. The trend is less distinct regarding the amount of crop and livestock losses, with the latter characterized by episodic events in 2009, 2010, 2016 and 2017.

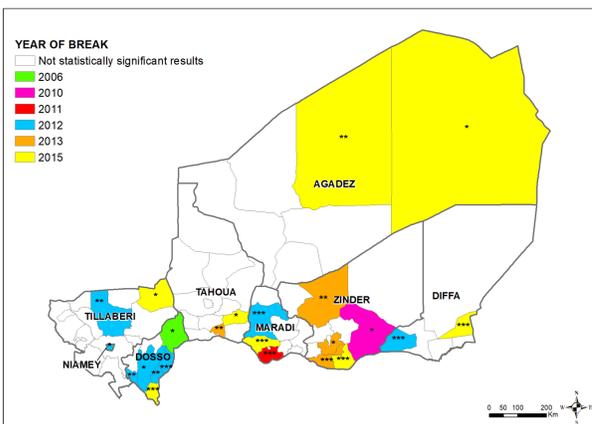
REGIONAL LEVEL

REGION	PEOPLE AFFECTED			SETTLEMENTS AFFECTED		
	LINEAR REGRESSION		BREAK POINT ANALYSIS	LINEAR REGRESSION		BREAK POINT ANALYSIS
	SLOPE	R ²	YEAR OF BREAK	SLOPE	R ²	YEAR OF BREAK
AGADEZ	+16,3	0,198	2009	+18,9	0,37**	2015***
DIFFA	+6,9	0,175	2012	+12,4	0,551**	2012***
DOSSO	+15,3	0,356**	2012***	+11,2	0,265**	2012**
MARADI	+17,4	0,381**	2010***	+23,4	0,555***	2010***
NIAMEY	+1,7	0,003	2012*	-1,7	0,009	2013
TAHOUA	+10,9	0,173	2013*	+17	0,559***	2013***
TILLABERI	+11,6	0,175*	2010	+9,5	0,133	2010*
ZINDER	+13,8	0,46***	2010***	+19,9	0,495***	2013***

Statistical parameters of linear regression and break point analyses at regional level in the 1998-2017 period (* = P < 0.1; ** = P < 0.05; *** = P < 0.01). Slopes are expressed as yearly percentage changes.

At regional level, linear regression models and break point analysis performed on people and settlements affected per year, indicated results often statistically significant. The significant regression models always have a positive slope and are mainly found for the settlements affected variable. Higher significant slopes are found for Maradi and Zinder Regions. Significant results were often found also in the break point analysis indicating highlighting not unidirectional increases. Most significant break points for both variables are found for the Regions of Dosso (2012) and Maradi (2010), while the region of Zinder shows a breakpoint in 2010 for population and a later in 2013 for settlements.

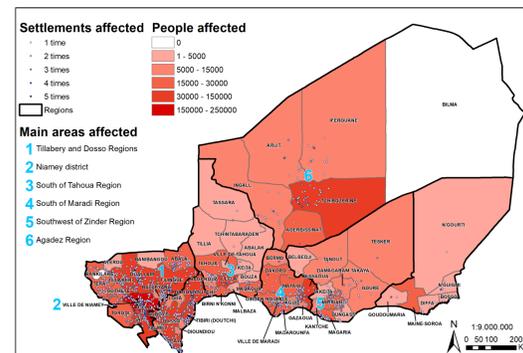
DEPARTEMENTAL AND SETTLEMENT LEVEL



Results of break point analysis at departmental level in the 1998-2017 study period for settlements affected variable (* = P < 0.1; ** = P < 0.05; *** = P < 0.01).

At departmental level, linear trend are less evident and sporadically statistically significant. On the other side, significant results were often found in the break point analysis indicating not unidirectional increases. Most of the years of break are comprised between 2012 and 2015.

Most floods happened in the southern Sahelian strip of the country characterized by average annual rainfall of 300 mm or more, but overall a very high percentage of municipalities (216 out of 261) were involved over the years demonstrating a high vulnerability of the whole country. Indeed, even the dry Region of Agadez shows Departments particularly affected. Recurrent floods affected 365 settlements and 90 of them were flooded 3 or more times. Moreover, floods mainly affected rural areas as 62.9% of people and 73.4% of localities involved are in rural municipalities. Most of events are mainly due to flash-floods rather than river floods.



Settlements and people affected per department in the 1998-2017 study period.