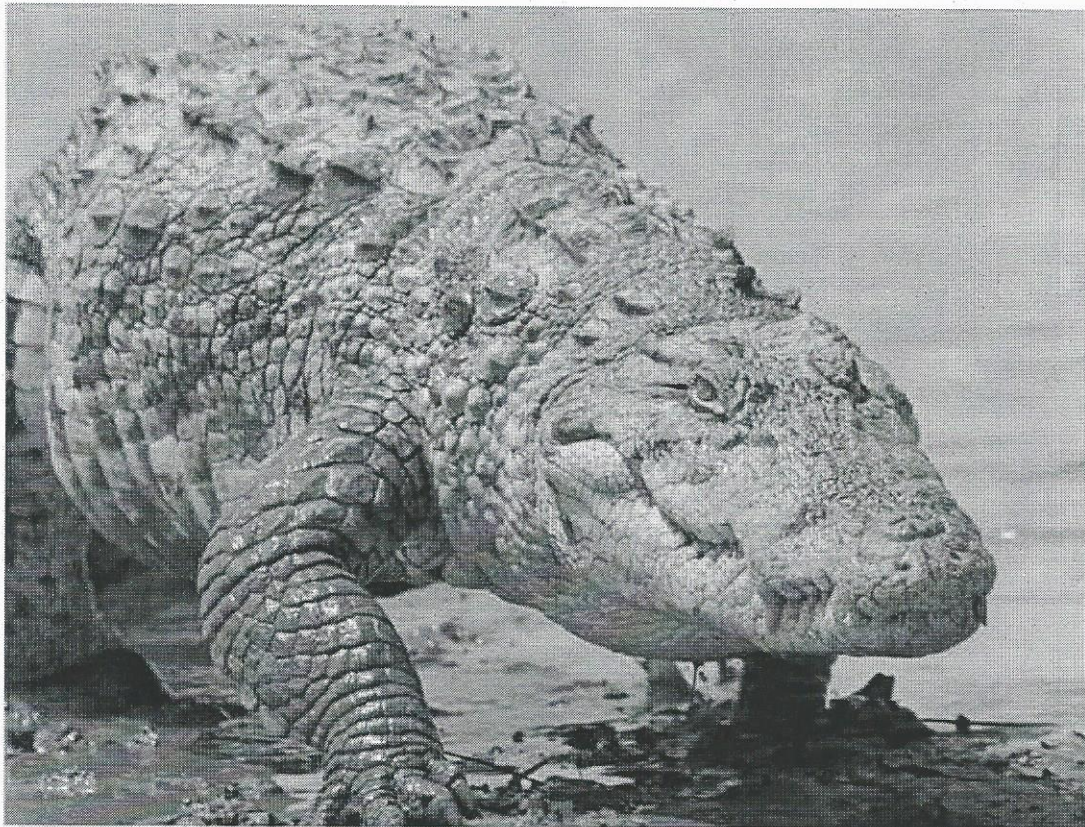


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# **CROCODILES**

**Actes du 2<sup>ème</sup> Congrès  
du Groupe des Spécialistes des Crocodiles  
sur la promotion et la conservation des crocodiliens en  
Afrique de l'Ouest  
tenu à Nazinga, Burkina Faso du 2-6 mars 2010**



**UICN – Union Internationale pour la Conservation de la Nature  
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**2010**

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## Human-crocodile interaction: empowerment of local people to deal with crocodiles around agropastoral dams in northern Benin

Gnanki N. Kpéra<sup>1,2</sup>, Guy A. Mensah<sup>1</sup>, Brice A. Sinsin<sup>2</sup>, Rigobert Tossou<sup>3</sup>, Karen Eilers<sup>4</sup>, Akke van der Zijpp<sup>4</sup> et Noelle Aarts<sup>5</sup>

<sup>1</sup>Institut National des Recherches Agricoles du Benin. [nathbiche@gmail.com](mailto:nathbiche@gmail.com)/[mensah@gmail.com](mailto:mensah@gmail.com)

<sup>2</sup>Laboratoire d'Ecologie Appliquée, FSA/UAC [crocobenin@yahoo.fr](mailto:crocobenin@yahoo.fr); [bsinsin@gmail.com](mailto:bsinsin@gmail.com)

<sup>3</sup>Département Economie et Sociologie Rurale/ Faculté des Sciences Agronomiques/UAC

<sup>4</sup>Animal production System/Wageningen University [Karen.Eilers@wur.nl](mailto:Karen.Eilers@wur.nl), @wur.nl

<sup>5</sup>Communication and Innovation studies [noelle.aarts@wur.nl](mailto:noelle.aarts@wur.nl)

### Abstract

Crocodylians have positive effects on their environment as keystone species that maintain with their activities ecosystem structure and function. These activities include selective predation on fish and aquatic invertebrates, the recycling of nutrients and the maintenance of wet refugia during periods of drought. Crocodiles are also cultural keystone species because they shape in a major way the cultural identity of a people. They play important ecological, cultural and economic roles for rural people.

The three African crocodile species are threatened with extinction and are listed in Appendix I of CITES (Convention on International Trade in Endangered Species of wild fauna and flora). The main threats of crocodiles are related to habitat loss and poaching for skin, meat, and other products. In Benin, crocodiles have decreased in number over the time in many rivers and ponds due to the increase of dry periods, expansion of human habitat and activities and over-poaching.

Most agropastoral dams in Northern Benin are characterized by permanent water availability and the abundance of fish which attract crocodiles where human and crocodiles are sharing the same resources: water and fishes leading to two sorts of interactions: Positive interaction and negative interaction.

- *Positive interaction* due to the acceptance of crocodiles as part of people's culture. This relationship is due to the fact that crocodiles represent a divinity for certain ethnic groups (Batonou, Mokole, etc.) resulting in their active protection.
- *Negative interaction* caused by crocodile attacks on people, dogs and livestock (goat, sheep, cattle, etc.), their high predation on fishes, and the destruction and damaging of water infrastructures, dams and fishing nets.

Understanding human-crocodile interaction can lead to possibilities to adapt agropastoral dams utilization, while tackling ecological, socio-cultural and institutional aspects of natural resources management. What makes this study unique is that it adopts a holistic, multidisciplinary and systems approach to study integrated water management to improve people's livelihood starting from the frames as constructed by local people.

### Conceptual framework

#### ❖ Domain of study

Complex human-crocodile interactions in agropastoral dams can be analyzed by using a holistic system approach to express its ecological, socio-economic and institutional aspects. The conceptual framework used in this study is presented in Figure 1. Systems' thinking is useful to understand how different components interact with each other.

The system components are agropastoral dams, crocodiles, community and livestock. Agropastoral dam as a resource is a main sub system with many components such as water, crocodile, fish, other aquatic animals and plants. Crocodiles are considered a separate component, which survival depends partly (as they can move away) on the dam in terms of water and food (fish) availability.

For many African local people in general and Benin's people in particular, crocodiles maintain water presence during dry season, which means that the existence of dams depends somehow on crocodiles. Local communities use dams for their activities (livestock production, fish production, vegetable production, house construction, domestic utilization, additional drinking water, etc.) and dams also need villagers for their maintenance and sustainable use. Crocodiles and villagers meet each other at dams where they can interact positively (tolerance of each other) or negatively (crocodile's attack on livestock, crocodile's high predation on fish, damage on dam's infrastructure, injuries to people, poaching of crocodile). Positive interaction is underpinned in Batonou, Boo and Mokole socio-cultural groups' thoughts and believes in Benin (Kpera, 2007). Herda-Rapp & Goedecker (2005) mentioned that human-animal interaction depends on socio-cultural drivers such as norms, values, assumptions, believes, etc. According to Manfredo (2008), the traditional view of culture encompasses three realms: action, perception or ideological, and material. Action includes individual's observable behavior. The material realm involves all human-made items and artifacts. Perception or ideology includes the domain of what people think, which includes values, norms, beliefs, knowledge, traditions, customs, and understanding. In this view, culture is the accumulated societal knowledge that is passed between generations. It adapts humans to their social and environmental surroundings.

Dams receive everyday livestock consisting of local livestock and transhumance livestock, which generate conflict between farmers and pastoralists. Strange crocodiles, which come from rivers and natural ponds, enter the system. In turn, crocodiles also move away from dams to other rivers and ponds. According to Campos *et al.* (2006), crocodilians can move large distances. Movements may be related to reproduction (Coutinho *et al.*, 2000), food (Campos, 2003), seasonal changes in water level (Ouboter & Nanhoe, 1988), or to avoid predators or pathogens (Campos *et al.*, 2003). Additional fish is added in dams to intensify fish production.

Some produced vegetables and fish are destined for sale outside community. Illegal use of crocodiles for meat and for products and by-products in traditional medicine are also sold outside the community. In addition, livestock is sold in the markets generating income for local people. Therefore agropastoral dams are very useful for local people in the sense that they generate money improving local people livelihood.

Institutional context of the system is related to water governance and socio-cultural aspects. Many stakeholders are involved in the agropastoral dams: the government, extension service, water management teams, water users, livestock producers association, farmers association, municipalities and NGOs (Kpera, 2009). Governance, in broader sense, includes the legitimate authority exercising the government power and managing of public affairs. There is greater emphasis on participation, decentralization, accountability, responsiveness and even broader concerns, such as those of social equity and justice (Ballah, 2008).

In addition, water comes in many forms that are typically governed by different legal, economic and cultural aspects (Ballah, 2008), such as the activities of NGOs providing local people with technical and financial help and the power executed by local and

international markets. Socio-cultural and political environmental factors also affect agropastoral dam management.

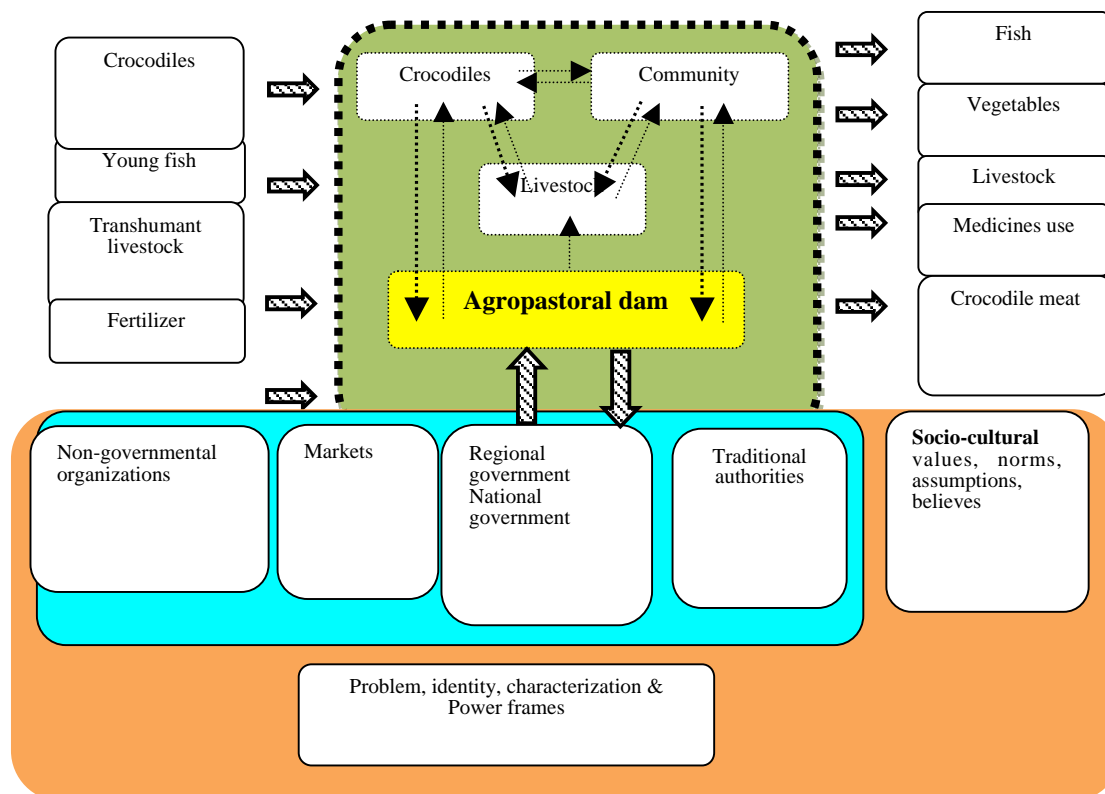


Figure 1. Agropastoral system showing relations between system components and institutional context.

### ❖ Theoretical framework

The human-crocodile interaction around agro-pastoral dams in Northern Benin is studied with the following theoretical concepts: framing and multi-level perspective.

#### - *Multi-level perspective (MLP)*

The key point of the Multi-level perspective is that system innovations occur as the outcome of linkages between developments at multiple levels (Geels, 2005). Multi-level perspective (MLP) distinguishes 3 levels of heuristic and analytical concepts: niche innovations, socio-technical regimes and socio-technical landscape (Geels, 2002). MLP emphasizes that system changes come about as a result of the interplay between processes at different levels in different phases. It explains how system begins from the micro-levels (niches), where promising innovations are developed through learning and experimentation. Niches are important, because they provide locations for learning processes, which occur on many dimensions (technology, user preferences, regulation, symbolic meaning, infrastructure, and production systems). Niches also provide space to build the social networks which support innovations. Above the niche level, the meso-level is formed by socio-technical system (regime) comprising of institutions, technical elements and network of actors. Above the regime, the macro-level is formed by the sociotechnical landscape comprising policies, world views, paradigms, social values, etc. that place pressure on or shape

the regime to either hinder or create opportunities for niche innovations (Geels, 2007).

Geels (2005) point out that an important aspect of the MLP is to do away with simple causality in system innovations, which come about when these processes link up and reinforce each other (circular causality).

- *Framing*

Framing concept is particularly relevant for researchers studying conflict, negotiation and inter-group interactions (Dewulf *et al.*, 2009; Gray, 2003). This concept is used to understand the rules that govern our appreciation of our world and enables us to differentiate between different sorts of reality (Goffman, 1974). Framing has to do with making sense, interpreting, and giving meaning to what is happening in the ongoing world. We approach framing not only as an (inter)active, but also as a dynamic, way of acting (Aarts *et al.*, 2008). According to Entman (1993: 52), “to frame is to select some aspects of a perceived reality and make them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation for the item described.” By framing events, developments, and/or phenomena in interaction, people are doing something or, in other words, become active agents (Frake 1977). Out of innumerable possible descriptions in our conversations, we choose specific descriptions of reality in order to accomplish goals through interaction in a specific context. Examples of such goals are accusing people, complimenting people, entertaining people, shifting responsibility, constructing credibility, constructing a desired identity, realizing a specific interest, etcetera. Generally speaking, such goals have to do with influencing the content, the interaction-process, and/or the relationship with the actor(s) involved (Dewulf *et al.*, 2009).

The choice of a certain frame depends not only on the goals of the people in the interaction, but also on the cues given by others involved in the interaction, as also the repertoire of frames that is already present (Bateson, 1954; Gray, 2003). Frames are iterative: they determine the interaction and are formed in the interaction by experiences, expectancies and goals that are considered by the people at that very instant (Aarts and Van Woerkum, 2006).

Gray (2003) distinguished different frames. In this research, we will analyze four of them: problem frames, identity frames, characterization frames, and power frames.

- *Problem frame*

Problem frames refer to the issue at stake and are constructed to define what the problem is about, including causes and solutions.

- *Identity Frames*

Identity frames are statements of one’s own identity in relation to the problem or the conflict at stake. Identity frame is frame about self. This is related to (i) core identity (ethnic, gender, racial, culture), (ii) societal role (references to place in society), (iv) place (references that link self to place) (v) institution (reference carries representative role with agency, organization, association, or references to profession or occupation) (vi) Interest-based (identity references to particular concerns, or issues, non-geographic, community, or interest group around particular causes or shared values. According to Shmueli *et al.* (2006), identity



frames are often salient and part of the polarized discourse in intractable conflicts.

- *Characterization frames*

Characterization frames are statements of “the other”, which may be a person or a specific group (Gray, 2003). Characterization frames are reductionist labels, associating positive or negative characteristics with individuals or groups (Shmueli *et al.*, 2006). They are frames about others that have a normative or evaluative quality. The strength of these frames lies in their being shared, so people can communicate them to others who understand them in the same way. In intractable conflicts, characterization frames may undermine opponents’ legitimacy, cast doubt on their motivations, or exploit their sensitivity. Identity and characterization frames are created to place oneself or the group in a wider social context. They are at times linked, strengthening one’s own identity while justifying actions toward the other, as we frame opponents as our opposite (Gray, 2003). These frames implicitly or explicitly define how an individual or group sees itself in relation to others.

- *Power frames*

Power frames are statements of the ability to influence the situation, both one’s own and others’ ability (Gray 2003). Power frames are often embedded in struggles to alter existing institutions or decision-making procedures. In case of conflict, disputants’ conceptions of power (the basis on which social decisions are or should be made) are important in conflict dynamics. These frames shape disputants’ assessment of which forms of power are legitimate and which are likely to advance their own position. The more intractable the conflict is, the more stakeholders are likely to interpret events as mutually exclusive power struggles, resulting in polarization. Traditional decision-making processes give way not to dialogic forms of dispute management (perceived as reinforcing existing power imbalances) but rather to adjudicatory, civil, or violent confrontations (legitimated by the perceived power imbalance) (Shmueli *et al.*, 2006).

(Dewulf *et al.*, 2009) distinguished two main approaches in framing studies: the cognitive approach and the interactional approach. Formulated by Minsky (1975) in the field of artificial intelligence, cognitive approach focus on cognitive frames or mental structures that help us to organize and interpret incoming perceptual information by fitting it into pre-existing categories about reality (Dewulf *et al.*, 2009; Minsky, 1975). In research using cognitive framing approach, frames are considered as stocks of knowledge used by individuals to assess new information.

The interactional approach of framing research is linked to the early work of Bateson (1954) on meta-communication in which framing is defined as exchanging cues that indicate how ongoing interaction should be understood Dewulf *et al.*, 2009. In this approach the definition of framing corresponds to what Entman (1993) said: ‘to frame is to select some aspects of a perceived reality and to make them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation’. Frames are alignments or co-constructions produced and negotiated in interactions (Dewulf *et al.*, 2009). Interactional frames are thus communicative devices used by participants in

interaction to negotiate meanings and alignments. The interactional approach to framing enable thus to understand how participants in a conflict co-construct meanings and negotiate alignments while interacting.

Both framing research traditions are useful to gain insight in conflict dynamics, but they give a different kind of understanding of how and why frames change (Minsky, 1975).

### **Formulation of the problem**

Water and grass requirement for livestock continues to be one of the major constraints for the development of livestock production in They contribute meaningfully to people's livelihood. Human being's negative activities and behavior on dams will also impact dams and thus negatively affect biodiversity. In addition, the removal of trees adjacent to dams will reduce habitat for many animals. Cropping systems also affect agro-pastoral dam's viability. Many cotton farms and food crop farms characterized by high pesticide and mineral fertilizers use are surrounding agropastoral dams. This refers to the problem of water pollution claims by local people (Kpera, 2009). To solve these problems of water pollution good agricultural cropping systems in harmony with the environment are needed Northern Benin. In order to solve water scarcity, the government of Benin decided in 1975 to build around 180 agropastoral dams (water reservoirs) in the northern part of the country (Bouraima, 2006). The assigned goals were to provide additional drinking water to livestock during the dry season in order to increase dairy production, to facilitate fish farming in these waterholes, and to facilitate vegetable farming to women as an activity during the dry season. But these waterholes were quickly invaded by crocodiles thus hindering the enjoyment of their assigned goals. Local people and crocodiles are now sharing the same limited resources (water and fish). This interaction between people and crocodiles in villages led to two sorts of interactions: Positive interaction and negative interaction.

i. *Positive interaction.* This relationship is due to the fact that crocodiles represent a divinity for certain ethnic groups (Batonou, Mokole, etc.) resulting in their active protection. This is a typical example of «endogenous conservation» and represents one of the most important means for their protection in Benin. Local people assist crocodiles by respecting their existence rights and agency to act in their own best interests; the crocodiles for their part, when treated this way, become non-aggressive. This pact creates a peaceful relationship between crocodiles and people based on reciprocity and mutual respect (Kpera, 2002; 2007).

ii. *Negative interaction.* Negative interaction between human and crocodile is due to crocodile attacks on people, dogs and livestock (goat, sheep, cattle, etc.), high predation on fishes, and to destruction and damage of water infrastructures, dams and fishing nets. There is little insight into why these conflicts arise beyond two commonly offered explanations: (a) intrusion of crocodiles into people's spaces; (b) uncontrolled raise in crocodile numbers.

Agropastoral dams have many functions and a spectrum of stakeholders is involved in their use and management. They contribute meaningfully to people's livelihood. Human being's negative activities and behavior on dams will also impact dams and thus negatively affect biodiversity. In addition, the removal of trees adjacent to dams will reduce habitat for many animals. Cropping systems also affect agro-pastoral dam's viability. Many cotton farms and food crop farms characterized by high pesticide and mineral fertilizers use are surrounding agropastoral dams. This refers to the problem of water pollution claims by local people (Kpera, 2009). To solve these problems of water pollution good agricultural cropping systems in harmony with the environment are needed. Several technical and institutional constraints

are bottlenecks of optimizing dams use. Studying the institutional context, constraints and opportunities can be found and explained. Finally, innovative ideas emerge and represent some opportunities that can be experimented with communities for good integration water management in Northern Benin. There are fishing methods, new techniques to deal with water pollution, endogenous methods of crocodile conservation and peaceful collaboration.

In light of available data, understanding of human-crocodile interaction can lead to possibilities to adapt agropastoral dams utilization, while tackling ecological, socio-cultural and institutional aspects of natural resources management. What makes this study unique is that it adopts a holistic systems approach to study integrated water management to improve people's livelihood starting from the frames as constructed by local the people.

### **Research objectives**

Understand human-crocodile interaction around agro-pastoral dams by studying the frames that local people construct in interaction and studying the behavior and habitat use of the crocodiles.

Specifically, this study aims to:

- 1- Understand the way stakeholders frame crocodile ecology and behavior in case of positive interaction and negative interaction;
- 2- Identify crocodile behavior contribution and habitat use and its relation to integrated water management;
- 3- Understand the way local people frame human-crocodile interaction in case of positive interaction and negative interaction;
- 4- Identify technical and institutional opportunities and constraints for peaceful collaboration between human and crocodiles and to dams uses;

### **Hypotheses**

The overall hypothesis of this research is the following:

The improved understanding of human-crocodile interaction will contribute to peaceful collaboration between humans and crocodiles, resulting in a better integrated water management.

#### *Sub- hypotheses*

1. Understanding stakeholders frame on crocodile ecology and behavior in case of positive interaction and negative interaction will improve human-crocodile interaction.
2. Understanding the way local people frame human-crocodile interaction in case of positive interaction and negative interaction will contribute to improve the coexistence between humans and crocodiles.
3. Integrated water management will be improved by local and scientific knowledge on crocodile ecology and behavior as well as by knowledge on human-crocodile interaction.
4. Identification of technical and institutional opportunities and constraints will improve human-crocodile coexistence and the optimization of agropastoral dams.

## Research questions and sub-questions

### 1. How do stakeholders in different local contexts frame crocodile ecology and crocodile behavior?

- What is the endogenous knowledge about crocodile ecology?
- What is the endogenous knowledge on crocodile behavior?
- How do endogenous knowledge on crocodile ecology and behavior contribute to dams use?
- How do people frame the use of agropastoral dams in different contexts (positive interaction, negative interaction and in between) and why?

### 2. What is crocodiles habitat use in agropastoral dams?

- What are the characteristics of crocodile habitats?
- What are crocodile Species abundance and population structure?
- What do crocodiles eat and what is the availability of feed throughout the year?

### 3. What is crocodile behaviour in agropastoral dams?

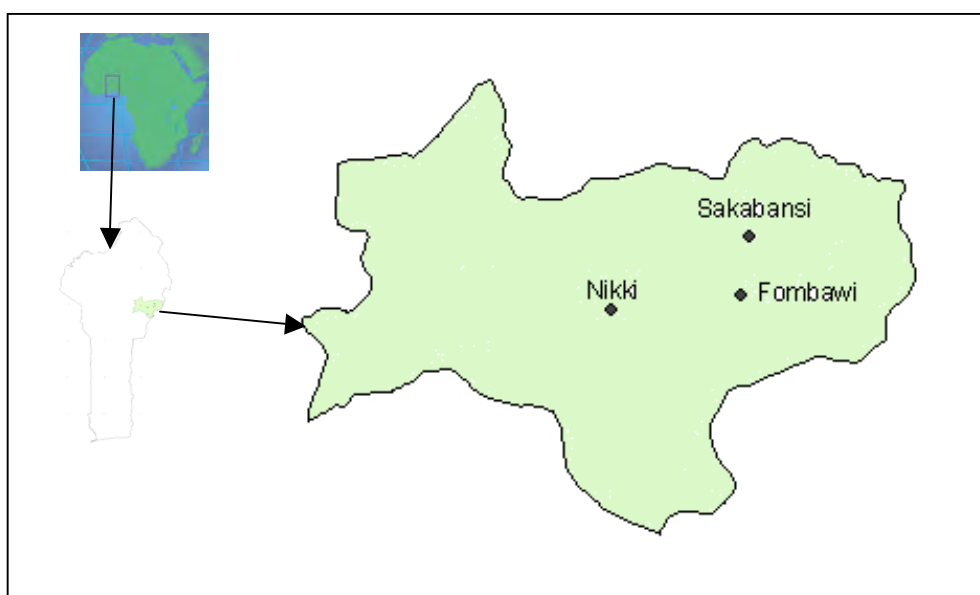
- What are the different daily activities of crocodile?
- How is the behaviour of crocodiles in relation to human activities in different contexts?

### 4. How do people frame human-crocodile?

- How people behave in case of positive interaction and negative interaction?
- What effect do these frames have on the human-crocodile interaction in different agropastoral dams?
- What can be learned from differences in human-crocodile interaction and in which different ways human-crocodile interaction works?
- What opportunities can human-crocodile interaction offer to enhance dams management and sustainable dam use?

## Study area

The study will be carried out Nikki municipality located in the Borgou District in North-Eastern Benin (figure 2).



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