IAHS2022-184
IAHS-AISH Scientific Assembly 2022

Suspended particulate matter and water fecal pollution in the Niger River at Niamey

Moussa Boubacar Moussa[1,2], Amadou Abdourhamane Touré[1], Bruno Lartiges[2], Emma Rochelle Newall[3], Laurent Kergoat[2], Elodie Robert[4], Marielle Gosset[2], Bachir Alkali Tanimoun[5], and Manuela Grippa[2]

[1]Université Abdou Moumouni, FAculté des Sciences et Techniques (FAST)- département de Géologie, Niamey / Niger
[2]Université Toulouse III Paul Sabatier, Géosciences Environnement Toulouse (GET- UMR 5563 CNRS / UR 234 IRD / UM 97 UPS / CNES
[3]University of Paris, iEES Paris 113, S-U 113 – CNRS 7618 – IRD 242 – INRAE 1392, France
[4]University of Nantes, LETG-Nantes UMR 6554 CNRS, France
[5]Niger Basin Authority (NBA), Niamey/Niger

130 million residents use the Niger River water for agriculture, fishing, transport and domestic activities. Suspended particulate matter (SPM) and other waste, washed into the river during rainy events, constitute a favorable environment for bacteria proliferation since it provides protection from ultraviolet radiation, offers nutrients and ideal living environment. The objectives of this work are to: characterize the concentration and nature of SPM in the middle Niger River and analyze their spatio-temporal variability; study the link between SPM and indicator of fecal bacteria contamination (*E. coli*); quantify the part of fecal pollution that the Niamey city brings into the Niger River.

Two regular monitoring sites were set up on the Niger River and two periurban lakes east of Niamey. Measurements of SPM were made by filtering water samples acquired during two full years. Water color was monitored by above-surface radiometer operating in red and infrared bands and Sentinel-2 satellite. *E. coli* content and physico-chemical water parameters were also monitored and SPM were analyzed using electronic microscopy and laser granulometry.

The analysis of SPM revealed extremely fine (0.2 µm) particles of mineral origin (kaolinite) with some iron oxide/hydroxide during the red flood. Radiometric measurements by both the in-situ radiometer and Sentinel-2 were found to be well suited to monitor SPM dynamics in this area. SPM and discharge showed a complex relationship : SPM increases before the discharge increase at the beginning of the red flood but they are at their lowest during the black flood. SPM concentration and *E. coli* somewhat co-vary at the beginning of the rainy season but *E. coli* values remain relatively high during the black flood, despite low SPM at that time. *E. coli* concentration at the downstream station reveals an important fecal pollution from the Niamey city with *E. coli* values on average 10 times higher than the upstream station. Maintaining and developing monitoring tools in this area is particularly important in the context of global environmental changes, as for example the increase in the red flood discharge observed in Niamey since the 90's, that may deeply modify the transfer of contaminants in surface waters.