

# **Cotonou Seaport Environmental Platform : a new tool for monitoring biological invasions**

Henri-Joël Dossou & coll.

Novembre 2022

# Biological Invasions : Environmental, health, agricultural and socio-economic issues



Maritime exchanges

- Biodiversity erosion
- Spread of veterinary and human pathogens
- Introduction of crop pests and stocks
- Associated costs, infrastructure damage



**Article**  
**High and rising economic costs of biological invasions worldwide**

<https://doi.org/10.1038/s41586-021-03405-6>  
 Received: 8 April 2020  
 Accepted: 28 February 2021  
 Published online: 31 March 2021  
 Check for updates

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Biological invasions are responsible for high economic losses to society and management of these invasions<sup>1,2</sup>. If of a reliable, comprehensive, standard monetary costs of biological invasions reported costs of invasions reached over the past few decades (1970–201). Moreover, we estimate that the annual costs remain strongly underreported. These costs remain strongly underreported, exhibiting a consistent threefold documented costs are widely distributed taxonomic scales, with damage cost management expenditures. Research biological invasions need to be further the implementation of consistent management agreements that aim to reduce the




**BA** **SE** *Biotechnol. Agron. Soc. Environ.* 2020 24, 28–36 **OPEN ACCESS**

**Invasive rodents and damages to food stocks: a study in the Autonomous Harbor of Cotonou, Benin**

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Received 10 February 2019, accepted 13 November 2019, available online 17 December 2019.  
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**Description of the subject.** Rodents may be major pests to crops and stored food, thus threatening food security. Among them, invasive species such as rats and mice are of particular concern since they are disseminated globally following international trade. We investigated the small mammal assemblage within the international seaport of Cotonou, Benin, in order to determine the relative importance and distribution of native vs invasive rodent species, as well as to evaluate the amount and associated costs of rodent-induced damages on imported/exported stored goods (here, rice).  
**Objectives.** Description of rodent assemblages within an African seaport, and evaluation of the associated damages on stored food stocks.

✓ Damage on stored rice

**DISPATCHES**

**Genetic Characterization of Seoul Virus in the Seaport of Cotonou, Benin**

Guillaume Castel, Ravi Kant, Sylvestre Badou, Jonas Etougbéché, Henri-Joël Dossou, Philippe Gauthier, Gualbert Houéménou, Teemu Smura, Tarja Sironen, Gauthier Dobigny

Seoul virus is a zoonotic pathogen carried by the brown rat *Rattus norvegicus*. Information on its circulation in Africa is limited. In this study, the virus was detected in 37.5% of brown rats captured in the Autonomous Port of Cotonou, Benin. Phylogenetic analyses place this virus in Seoul virus lineage 7.

Because hantaviruses are host-specific, their geographic distribution is tightly linked to that of their host. However, the emergence of hantaviruses in new geographic regions is still possible by the spread of the rodent reservoir (2). Transport-mediated dissemination of rodent-borne hantaviruses is of critical importance in their distribution and constitutes a critical health concern (3). Seoul virus (SEOV), an orthohantavirus first identified in South Korea in 1982, has had a

Rodents are the most diversified order of wild mammals and are also the prevailing mammal

✓ Presence of Hantavirus

✓ High density of rodents in the harbour area

Acquisitions of past works at the Cotonou seaport

# Cotonou Seaport Environmental Platform : a new tool for monitoring biological invasions



## Cotonou Seaport Environmental Platform (PPSE)



# Collaboration agreement



Autonomous Port of Cotonou (PAC)



Belgian Development Agency (ENABEL)



UMR Center for Biology for Population Management / Research Institute for Development (IRD)



Biological Invasions Research Unit (URIB) / Polytechnic School of Abomey-Calavi (EPAC)



Biodiversity Center - Benin Station / International Institute of Tropical Agriculture (IITA)



# Main objective



Implementation of solutions to meet the current challenges of the Cotonou seaport, particularly those related to the fight against the introduction of invasive species



Invasive rodent



Tiger mosquito



Insect pests



Zooplankton

# Young and dynamic team led by researchers and teachers



PPSE Coordonnator  
IRD



PPSE Scientific Manager  
Mammalogy & Planktonology Manager  
EPAC



Entomology-Medical Manager  
CREC



Entomology-agriculture  
IITA



PAC Representative



- Monitoring :
  - the introduction of new invasive species,
  - risks by identifying certain pathogens circulating in rodents
  - resistance to the use of anticoagulants,
- Define eradication units through analyses of the genetic structure of rodent populations



Regular trapping of small mammals in PAC



Manipulations in laboratory





- Inventory the species of culicidal fauna in the port area in order to make a physical collection
- Study the seasonal dynamics of Anopheles, Aedes and Culex mosquitoes in the PAC
- Define mosquito resistance profile
- Mapping the potential breeding grounds for the different types of mosquitoes found in the harbour area
- Prevalence of vector species to arboviruses and the parasites they may potentially carry



Mosquito traps installation



Mosquitos captured



Mosquito observation under the microscope







- Build up a reference collection of insects of the commodities stored in the port warehouse
  - Create a database
  - Study the population dynamics of these stock pests over time
  - study the biology and ecology of the new species found
  - Prevent and sustainably control these biological invasions



Insect pest collection on stored rice

Analysis in the laboratory

Observing insects under the microscope

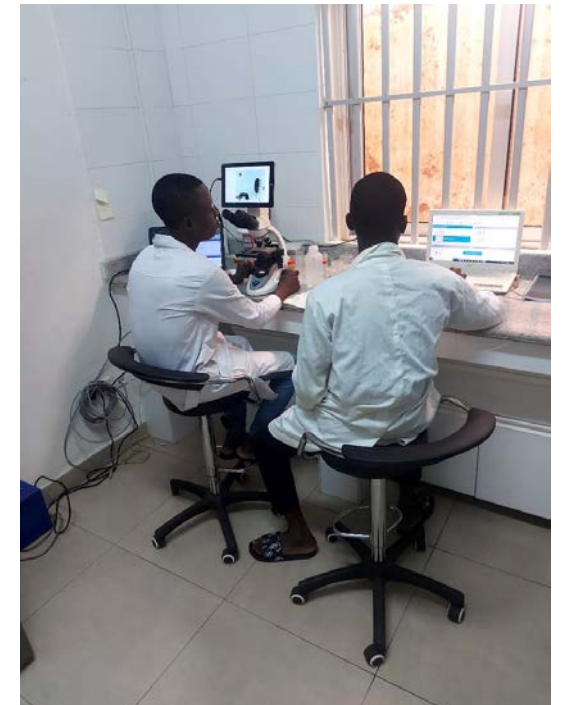
Assembly by taxonomic family in entomological boxes



- Inventory :
  - planktonic
  - macroinvertebrate of the Cotonou harbour basin
- Evaluate the physico-chemical and biological (zooplanktonic) quality of ballast water
- Evaluate the effectiveness of ballast water treatment



Prélèvement / filtrage d'eau dans le bassin portuaire



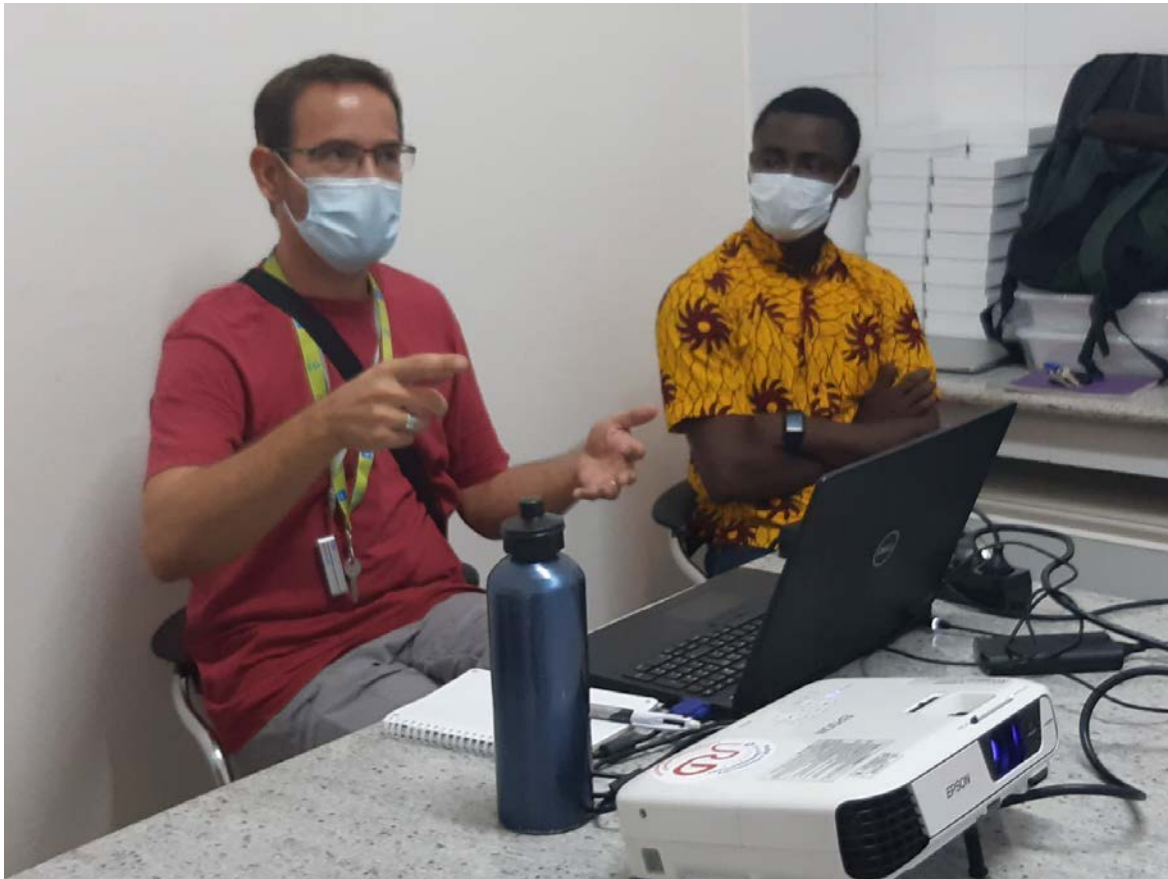
Identification par microscopie du zooplancton



## ▶ Habitat mapping within the port platform

- ✓ Analyses of the association between the harbour landscape and living organisms.
- ✓ Spatialization of the research results of the different teams.

- ✓ Training on medical biology techniques



- ✓ Training on database management / database backup

**MERCI DE VOTRE AIMABLE ATTENTION**

<https://view.genial.ly/6059bb3f64e78f0d9cb32a7f>