

Proposal for WWQA workstreams

Urban emissions of nitrogen and phosphorus to Lake Victoria of Africa:

Accounting, mitigation and climate change impacts

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Workstreams

Capa D

SDGs

Partners

Fundings

Previous works

Lake-Watershed integrated management for sustainable use of water in East Africa great lakes basins (2019-2022; MOST-UNEP)



Dr. Chen Shuang, Sophia



- Professor of geographic sciences, NUIST
- Director of Research Centre of Urban Sustainable Development, NUIST
- Deputy director of professional committee of Urban and Regional Management, Geographical Society of China

She recently studies water quality changes with urban development in the east African Great Lakes region. Since 2008 she lead a series of joint projects funded by UNEP, MOST and CAS of China, about water quality monitoring, water environment protection and sustainable land use in the region. Based on the work in both China and Africa, she has published over 100 papers in peer reviewed English journals or Chinese journals and participated in writing 4 Chinese books and 2 English books.

Major projects :

□ UNEP-MOST

- ✓ Enhancing **Capacity of Monitoring** Water Resource of Lake Tanganyika(2010-2013)
- ✓ **Water Quality** and Ecosystem Monitoring and Demonstration of New Waste Water Treatments in typical states/basins in Africa (2013-2016)
- ✓ **Lake-Watershed** Integrated Management for Sustainable Use of Water in East Africa Great Lakes Basins (2019-2022)

□ Sino-Africa center

- ✓ Water environment protection and sustainable **land uses** in the great lake watersheds of East Africa (2013-2015)
- ✓ Research on **urban development** pattern and environment changes in East Africa (2016-2020)

□ Other 3 projects about urbanization by NSFC

Urban emissions of nitrogen and phosphorus to Lake Victoria

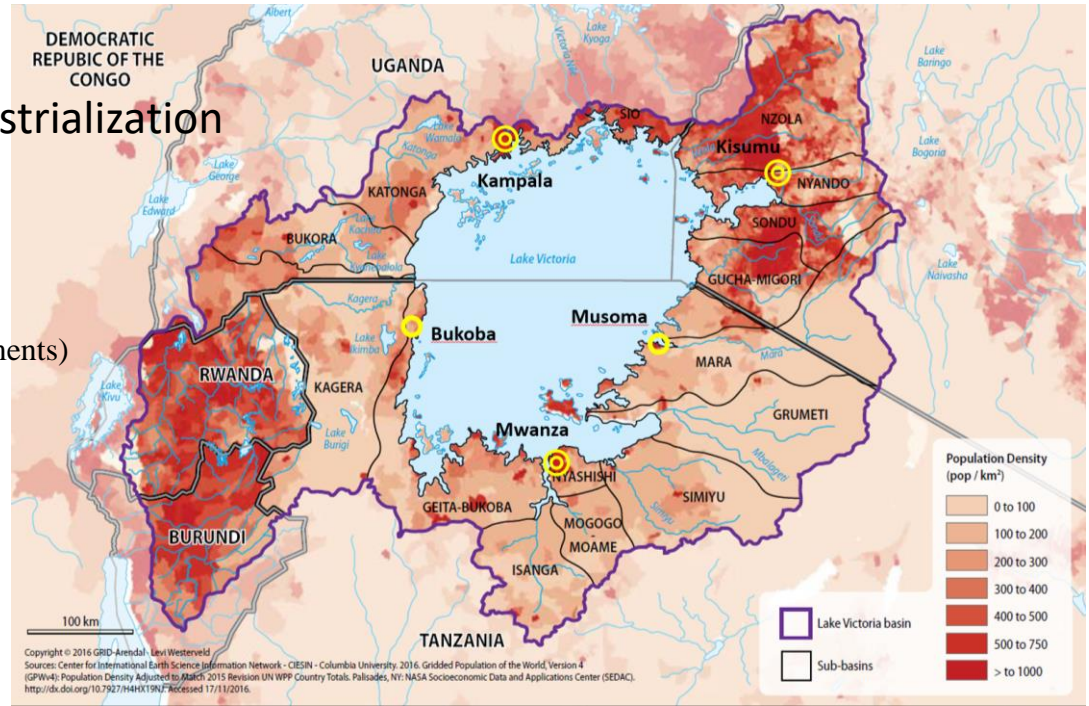
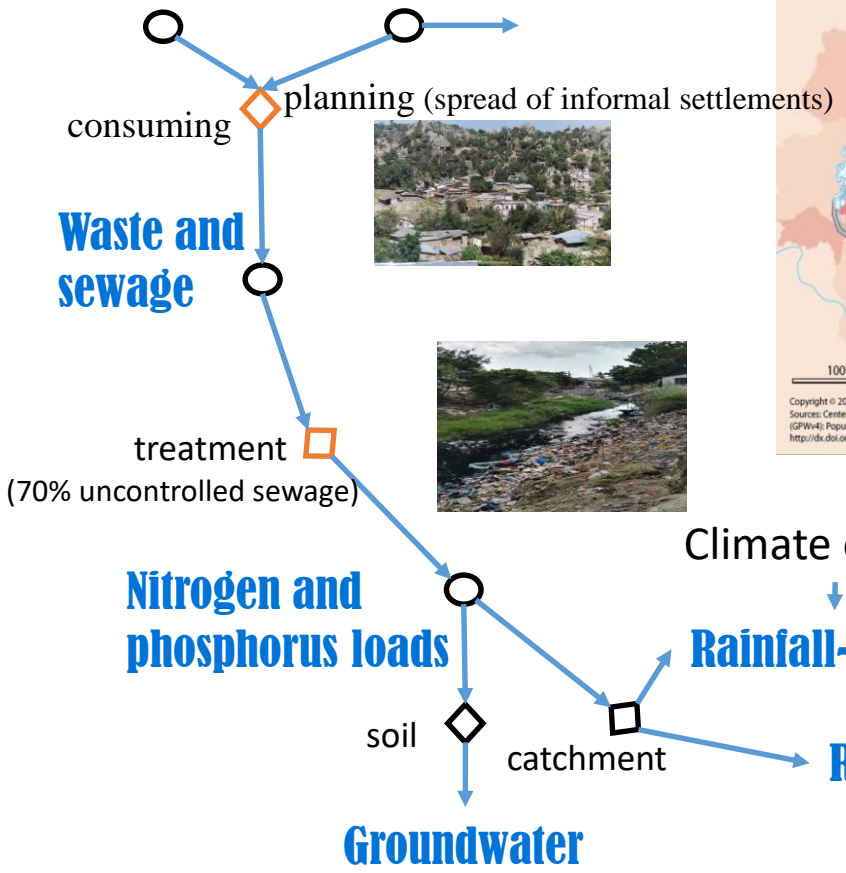
Proposal Rationale

Acceleration of urbanization and industrialization
(44 million population, 40% urban population)

Population **Production**

Climate change

policy



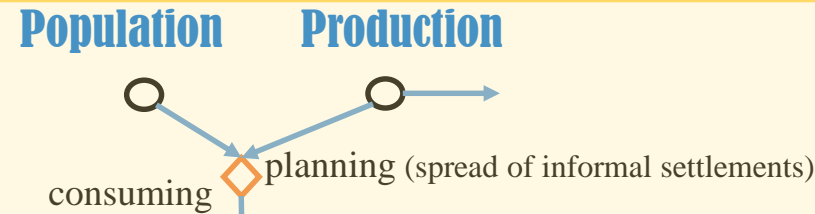
Lake Victoria is the second largest freshwater lake in the world and the most prominent ecosystem on the African continent. Since the 1950s, water quality has deteriorated and eutrophication has worsened. The area around the lake is densely populated. Due to the spread of informal settlements in large cities, uncontrolled sewage discharge into the lake with runoff has become the most significant environmental problem. Under the overall acceleration of urbanization and industrialization in Africa and the global climate change trend, it is of great practical significance and academic value to quantifying the urban non-point source nitrogen and phosphorus load along the lake Victoria and the effect of climate change.

Urban emissions of nitrogen and phosphorus to Lake Victoria

Methodology

Acceleration of urbanization and industrialization

(44 million population, 40% urban population)



Nitrogen and phosphorus loads

Groundwater

Rainfall-runoff

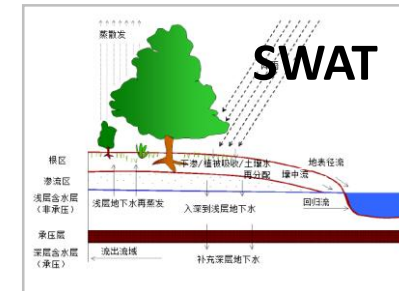
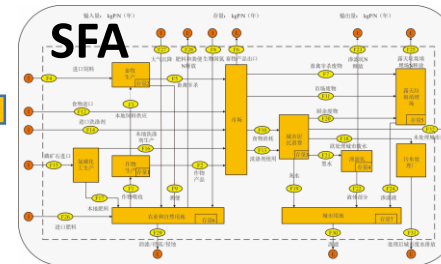
Rivers

Climate change

policy

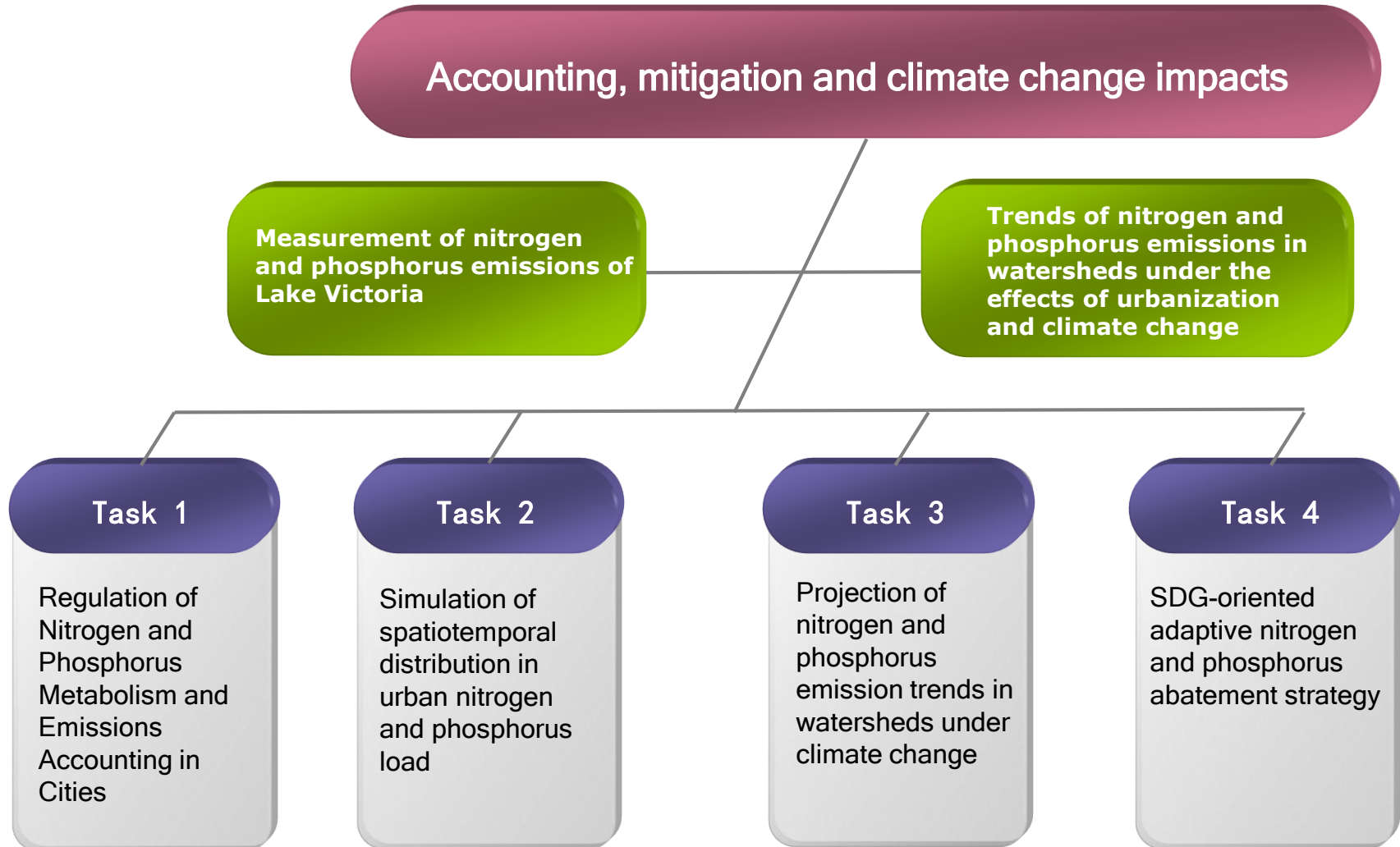
CMIP6-SSPs

----Pollution source surveys and assessments were conducted in the late 1990s to rapidly estimate lake nitrogen and phosphorus inputs based on coefficient methods. The results show that runoff and atmospheric deposition are absolutely dominant, while industrial and domestic emissions are largely ignored (Scheren et al., 2000).

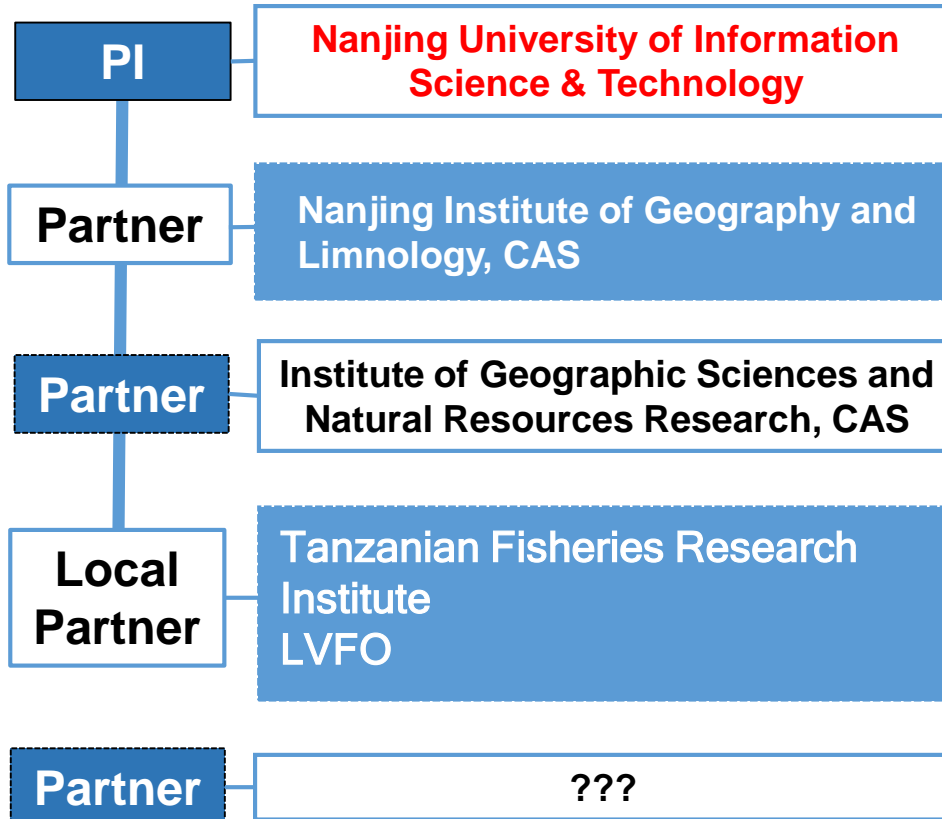


----Zhou et al. (2014) calculated the net nitrogen input of human activities in the watershed, which mainly reflected the amount of nutrient input loss in soil or water in the early stage of agricultural production.

Objectives and tasks



Partners and budget



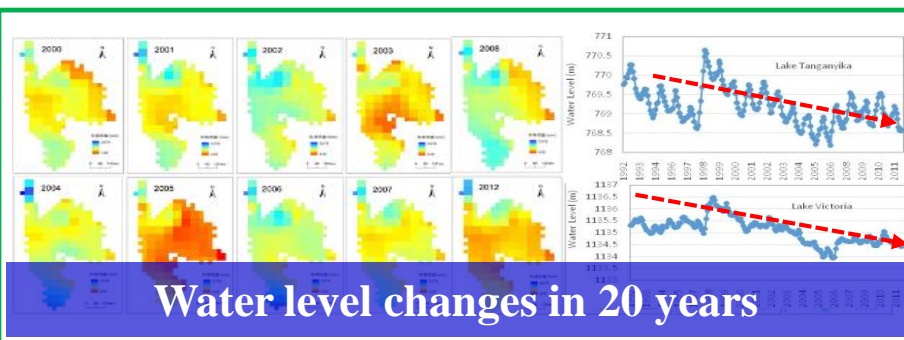
Regions & Countries of Operation:	Tanzania, Uganda, Kenya
Total value of the proposal in its entirety in US\$ (irrespective of applying for WWQA funds or/and using existing resources):	473 000 USD
Amount requested from WWQA seed-funds as co-financing (US\$):	45 000 USD

Cooperation activities in the east African Lakes

- ❖ Land use and water environment changes
- ❖ Lake level changes influenced by climate change
- ❖ River and lake pollution and eutrophication

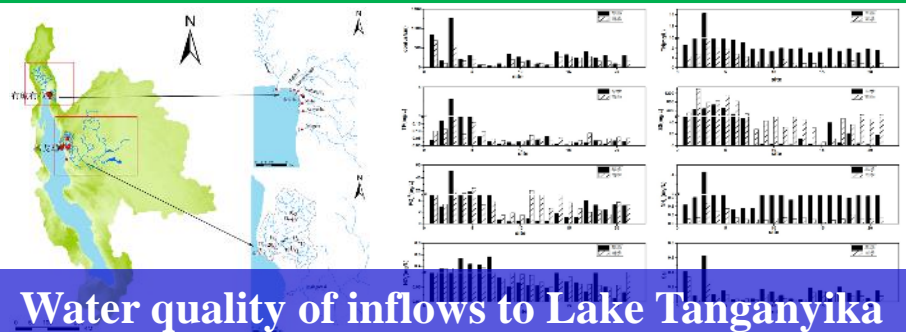
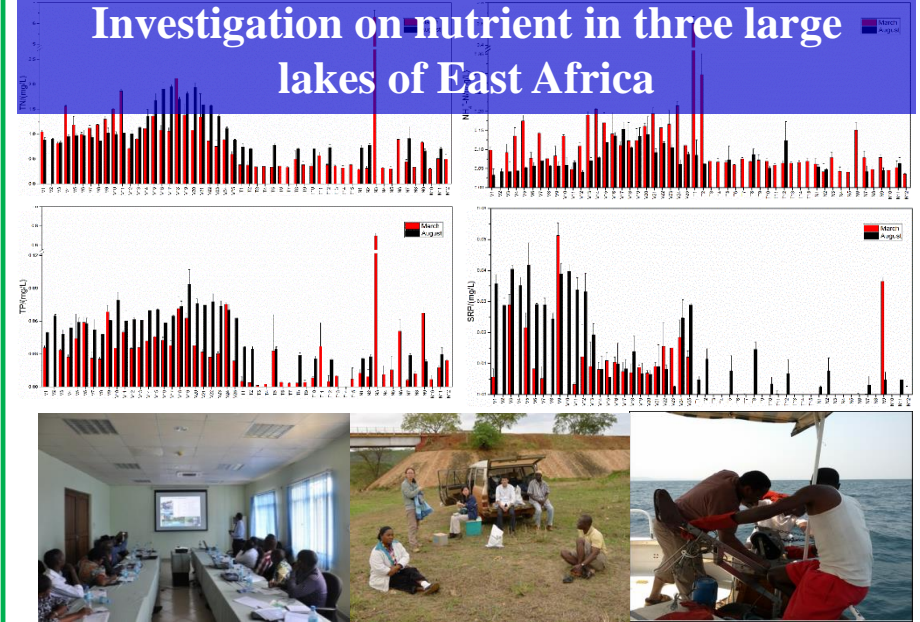


Published 3 research reports, 1 technic manual, 10 more peer reviewed journal papers about this region



Water level changes in 20 years

Investigation on nutrient in three large lakes of East Africa



Water quality of inflows to Lake Tanganyika

- ❖ Clarify the pollution characteristics of urban rivers and near urban lakes
- ❖ Find the mechanism of the influence of peri-urban informal settlements on lake bay water pollution
- ❖ Put forward the countermeasures to protect the water environment around the lakes



Nanjing University of Information Science & Technology

Nanjing, China

International Rankings



27



45



54



74

2018-2019 International University Rankings (Mainland, China)



Double First-Class Initiative

Key Edu. Strategy of Chinese Gov't in 2017.



NO. 1 in MOE Evaluation in 2012,2017

Atmos. Sci.



First Prize in National Teaching Achievement Award

Top ESI 1%

Discipline	Time	Present Ranking
Geophysics	2015.7	5‰
Engineering	2016.9	6‰
Computer Science	2017.5	3‰
Environment and Ecology	2018.9	1%

Undergraduates

30,000

Graduates

4000

Overseas students

1600

Overseas studying students per year

500

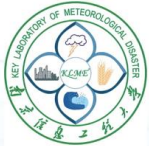
Research Platforms



International Joint Research Laboratory on Climate and Environment Change

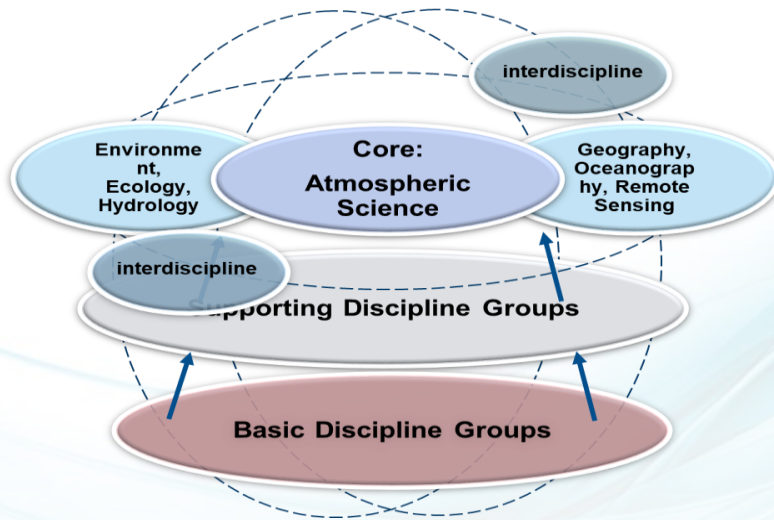


Collaborative Innovation Center on Forecast and Evaluation of Meteorological Disasters



Key Laboratory of Meteorological Disaster Ministry of Education

Discipline layout: One Core, Two Wings, Three Dimensions



Above all, this scheme, if considered for inclusion in the WWQA's workstreams, I will be more confident to apply for NSFC funding. Moreover, the project is an extension of the project currently being implemented, which can support each other in data and model technology. Furthermore, the measured data obtained by the project can also provide a reference for WWQA water quality remote sensing projects, and provide a platform for citizen science, capacity building and other plans.

**Thank you for
your attention!**