



Sediment Coring and Analysis on Tasaul Lake <i>(Razvan Mateescu, Laura Alexandrov)</i>	“Cercetari Marine“ Issue no. 37 Pages 32-38	2007
--	--	-------------

SEDIMENT CORING AND ANALYSIS ON TASAUL LAKE

Razvan Mateescu, Laura Alexandrov

*NIRDEP - National Institute for Marine Research and Development
“Grigore Antipa”, 300 Mamaia Blvd., 900581 Constanta, Romania
E-mail: rmateescu@alpha.rmri.ro, razvan_doru@yahoo.com*

ABSTRACT

The present work presents a three year study conducted mainly by NIMRD, Romania, under the coordination of the specialized staff from EAWAG Limnological Research Centre from Kastanienbaum, Switzerland, mainly Dr. Mike Sturm and Th. Alois Zwyssig, within the ESTROM project TASAUL. The sediment coring was extended in order to support the assessment of the anthropogenic impacts on Tasaul Lake, towards the ecosystem rehabilitation. In this regard, the sediments investigation based on field and laboratory works was developed in order to sustain certain key and specific approaches on a coastal lake ecology.

KEY-WORDS: lake sediments, coring techniques, sediment slicing

AIMS AND BACKGROUND

The project activities related to sediment sampling techniques and analysis of data required for the ecological study of the Tasaul Lake was designed to make a start on monitoring activities for the sediment inventory and evaluation of its spatial distribution in the shallow coastal lake, Tasaul, Romania. Due to the limited allocated funds, the sediment coring was referred to a single coring station where almost all procedures/protocols for the basic sediment studies and analysis were done during the project duration.

The assimilated items of the sediment sampling, including the data collecting and analysis techniques were developed mainly to determine chemical and physical properties of the lake sediment, and to fully evaluate the basic ecological state of Tasaul Lake, broad in relation with the carbon, nitrogen, heavy metals and contaminants occurring hydrocarbons.

MATERIAL AND METHODS

For the project purposes, more than 8 sediment cores were collected from an integrated stations network, but the sampling was focused on the deep areas of the lake. The sediment cores collected were analyzed for the water content, LoI, and porosity. The cores collected from 5 m depth were sampled 70 cm below the sediment surface,

The samplings were carried with a mechanical/gravitational corer from aboard boats equipped with Global Positioning Systems (GPS) and Eco-sounding device, used to support the effort and to permit to manage the work on the lakes.

The areas targeted for the coring as well for water sampling locations were identified and registered on specific collection worksheets. The sediment cores of fresh sediment were extruding (manually pushing a piston into the sediment tube), and for each sediment slices, were photographed and described the sediment type, before packing in plastic boxes. The sediment cores were sliced into approximately thirty sections, processed, and labeled. The selected sampling intervals were done according to expected approximately sedimentation rate determined by the closing of the marine lagoon and the lake arrangements history within last decades.

RESULTS AND DISCUSSION

Based on a specialization at EAWAG Limnological Research Center, Zurich, and WBG, Berne, Switzerland, organized in the framework of the ESTROM - TASAUL project, the coring acquisition, sampling, analysis and data evaluation were possible.

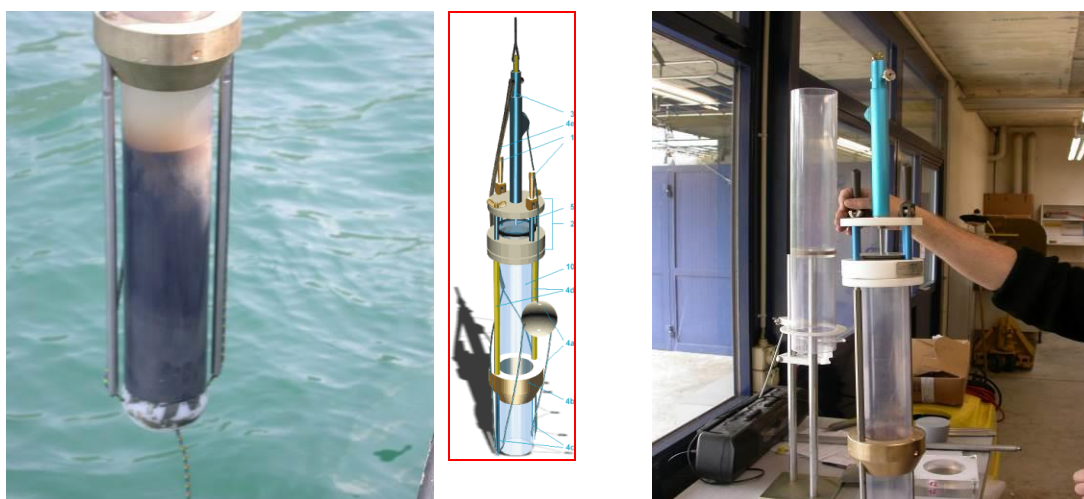


Fig. 1 a, b, c. Corer on the working desk/in the field

A special attention was focused on the top 25 cm of the core sediments, which were sliced at each 1 cm, and from below at each 2 cm, using a knife for transferring the wet sample into pre-weight test tube/box (polycarbonate test tubes or plastic boxes (10 ml, h=9.5 cm, $\varnothing=1.5$ cm, with write down TARE weight [g])). The included images present the main stages of the coring technology.



Fig. 2 a, b. Corer preparation in the field works

After the sampling, the sediment samples were preserved and stored in a cold-room at 4°C. Subsequent, were followed the complete procedures of drying and weighting, until constant weight is achieved, using an oven and an analytical balance (with an accuracy of ± 0.0001 g), and at each step of procedures was made an analysis for water content/sediment porosity.



Fig. 3 a,b,c. Sediment core preparation and extrusion

A similar procedure was performed for the LOI method, for C-analysis of sediment samples. In the same time, laboratory works encompassing a wide range of techniques involved in sedimentology field contribute in a crucial way at the implementation of monitoring/study components.



Fig. 4 a,b,c. Sediment core investigation/slicing

Table 1. Chemical parameters of Tasaul Lake sediments, August 2005, coring samples

Ref. No..	Station	Dry sediment g/100g wet sediment	Organic matter g/100g dry sediment dry (105°C)	PO ₄ mg/100g dry sediment	P total mg/100g dry sediment	P organic mg/100g dry sediment	SiO ₄ mg/100g dry sediment	NO ₃ mg/100g dry sediment	NO ₂ mg/100g dry sediment	NH ₄ mg/100g dry sediment
1	1	54.16	3.07	0.82	1.89	1.07	5.45	2.87	0.13	8.01
2	2	52.71	5	2.55	3.07	0.52	12.94	4.19	0.19	18.25
3	3/1 0-15 cm	23.69	13.65	4.7	6.19	1.49	46.33	14.23	0.57	79.94
4	3/2 15-30 cm	30.03	12.3	1.59	2.33	0.74	18.31	4.1	0.2	39.51
5	3/3 30-75cm	34.82	11.66	3.87	4.95	1.08	23.36	4.59	0.3	36.45
6	4	27.93	11	2.72	3.78	1.06	18.71	7.79	0.28	36.09
7	5	55.37	7.86	1.42	2.29	0.87	13.32	5.07	0.17	22.02
8	6/1 0-15cm	49.72	9.76	1.57	2.11	0.54	13.52	3.2	0.23	19.92
9	6/2 15-30cm	53.54	11.17	3.11	3.94	0.83	18.9	3.4	0.25	27.47
10	6/3 30-52cm	53.74	11.26	2.69	4.11	1.42	21.4	4.26	0.34	32.2
11	7	32.71	11.73	5.92	7.52	1.6	35.48	11.17	0.49	69.83
12	8	44.26	7.12	2.25	2.95	0.7	13.21	0.61	0.23	25.4

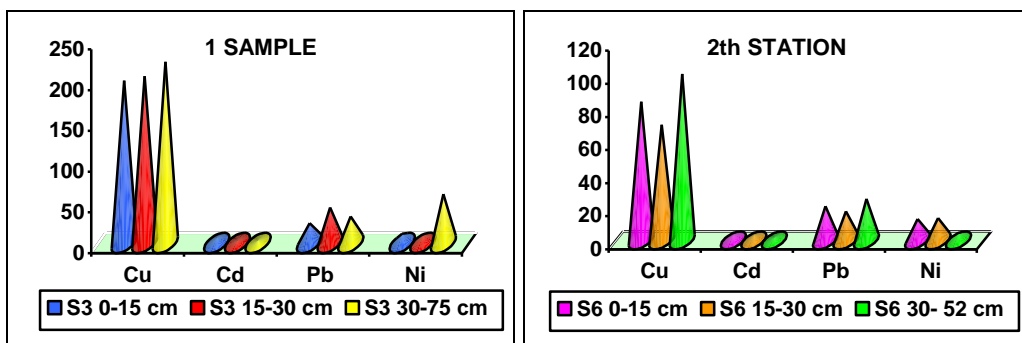


Fig. 5 a,b. Levels of trace metals in Tasaul Lake sediments in 2005 (μg/g dw)
Core sediments (A. Oros)

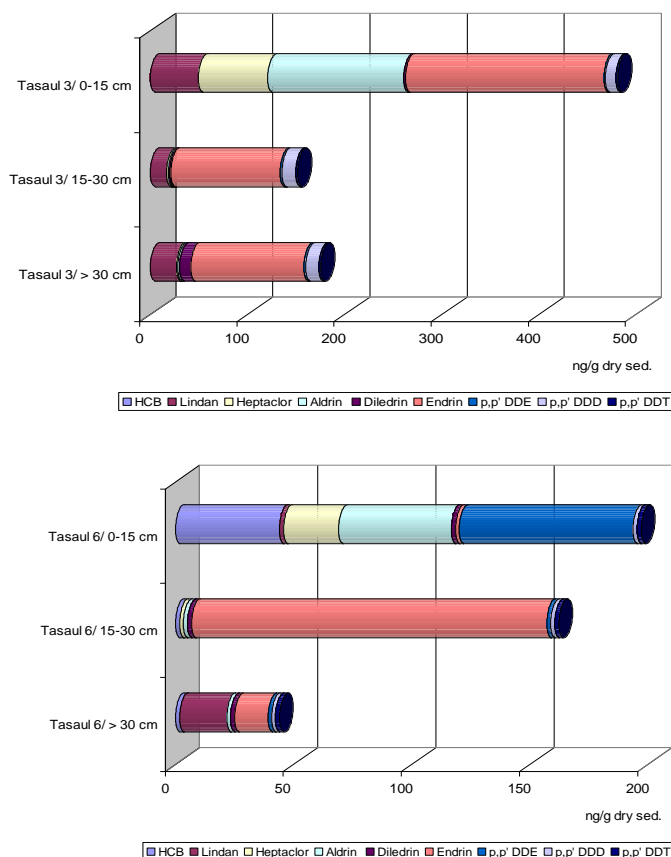


Fig. 6 a,b. Organochlorine pesticide levels in depth core sediment samples
collected from sites 3 (a) and 6 (b), from Tasaul Lake in 2005 (V. Coatu)

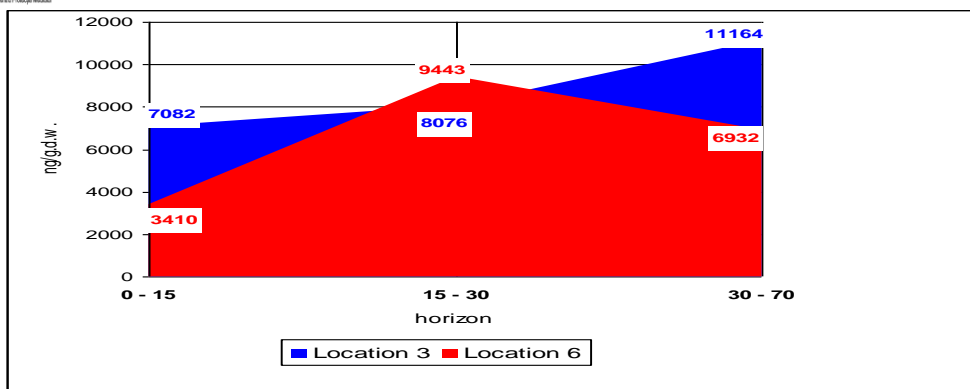


Fig. 7. Concentration distribution of the total PAH load in sediments

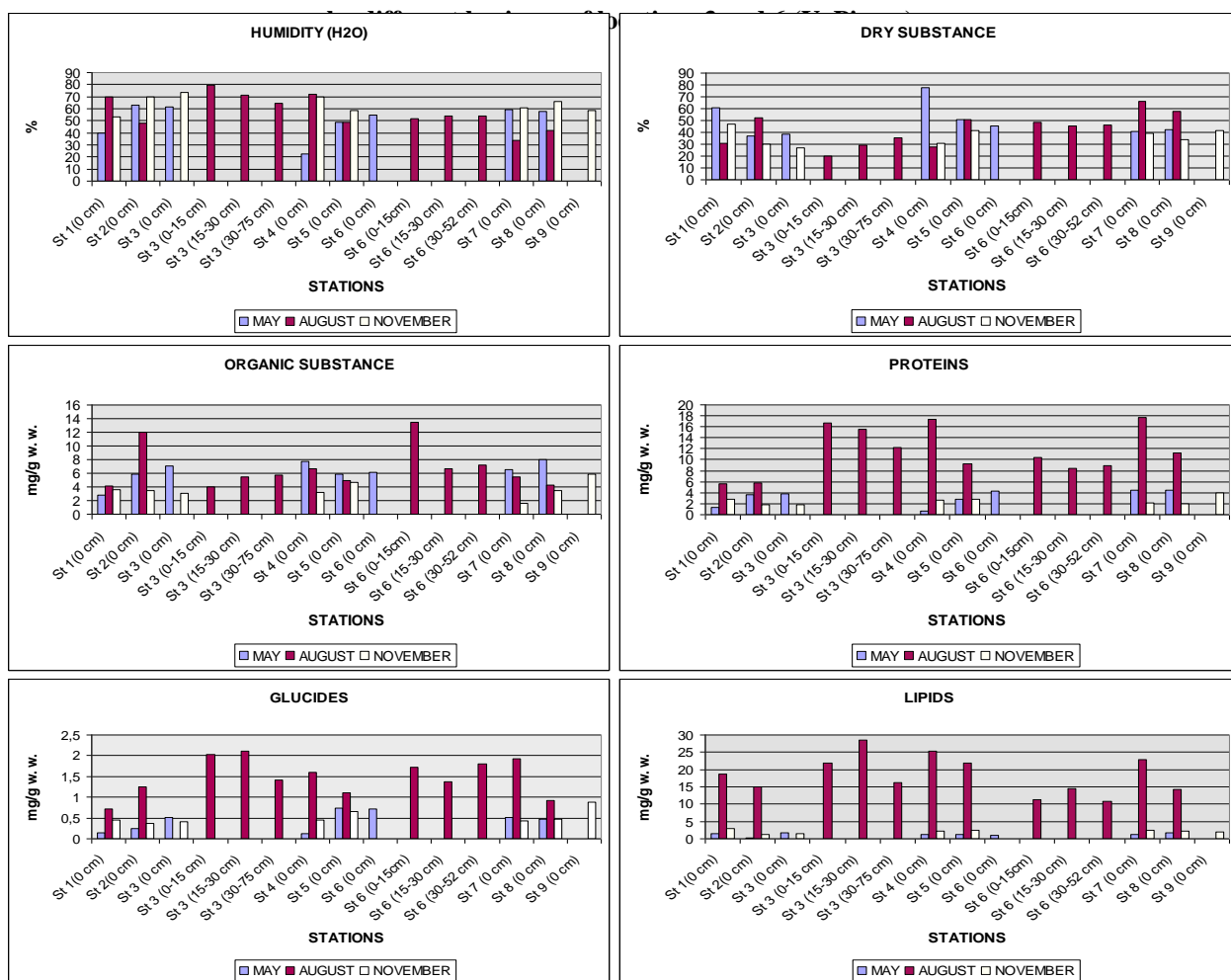


Fig. 7. Main physical and biochemical variables in depth core sediment samples 2005 (D. Rosioru)

CONCLUSION

Despite its singularity, the sediment coring and analysis over the Tasaul Lake sediments provided a record on the climate and hydrological processes, as well as water quality influence within a closed basin lake, which can give a signal on the individual impact of the tributary watersheds. For the future, it can be recommended the extension of the coring procedure for all lake sampling sites in concordance with Tasaul Project established strategy, increasing the number of the samples sliced for all sedimentary significant horizons, preferable overall length of the core, extension of sediment analysis in order to have a good image on the distribution of the sediment's characteristics, as well palette's extension of the sediment analysis, including metal tracers: Pb, Cs for special sedimentological studies extensions. All results are presented in the articles of Oros (pp. 66-74), Coatu (pp. 88-100), Piescu and Tiganus (pp. 74-87), this volume.

ACKNOWLEDGEMENTS

We express our gratitude to the project coordination of Dr. Jürg Bloesch and the best lessons of Dr. Bühner and Dr. Bloesch, too, from EAWAG, Dübendorf, and technical staff as Andreas Kohler, Hanspeter Hodel, Alessandro Grasso, Bernhard Luder and Daniel Wyder from BWG, Ittigen, given during the trainings on Technical hydrology, Gauging, Loads calculation, Coring at EAWAG, Switzerland.

REFERENCES

1. Blomqvist S. 1991 - "*Quantitative sampling of soft-bottom sediments: problems and solutions*", Marine Ecology Progress Series, vol. 72: 295-304;
2. Dearing, J.A. 1991: *Lake sediment records of erosional processes*, *Hydrobiologia* 214, 99–106;
3. Sturm, M., Vologina, E. G., Baster, I., De Batist, M., Oberhaensli, H., Macka, A. A. (2005) *Sedimentation pattern in ocean-like Lake Baikal*. *Sediment 2005*, Gwatt, Lake Thun, Switzerland, 18.-20. July, 138-139;
4. Teodoru C., Wehrli B. (2005) *Retention of sediments and nutrients in the Iron Gate I Reservoir on the Danube River*. *Biogeochemistry* 76 (3), 539-565.