

Information about the ESIL–Project:

ECOLOGICAL SURVEY OF ICELANDIC LAKES: A STANDARDIZED DATABASE

ESIL-Project team/founders and board

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Other institutes/scientists have taken part in the project. Participation was in the form of cowork in collection of field material, exchange of results and co-writing.

Cooperation – Institutes and experts:

Fish disease. Institute for Experimental Pathology, University of Iceland, Keldur, Reykjavík Halla Jónsdóttir and Sigríður Guðmundsdóttir.

Genetic aspects of fish. Zoological Department, Division of Biology, University of Guelph, Ontario, Canada. Prof. Moira Ferguson and Davíð Gíslason.

Taxonomy of freshwater molluscs. Dr. J.G. Kuiper, Garches, France.

Paleobiology/Taxonomy of Chrysophyceae. Prof. Jørgen Kristiansen, Botanic Institute, University of Copenhagen.

Chemical/Physical Analysis of Freshwater. Dr. Gunnar St. Jónsson. The Environment and Food Agency of Iceland.

Paleobiology/Taxonomy of Diatoms. Prof. John P. Smol. Queen's University, Kingston, Ontario, Canada.

Cooperation – Projects:

NORLAKE NORLAKE – <http://thule oulu.fi/NARP>

EUROLIMPACS – <http://www.eurolimpacs.ucl.ac.uk>

Students from U.S.A, Canada, France, Scotland and Iceland have participated in the ESIL project.

Aim of project

To build up a database with standardized ecological information on main types of Icelandic lakes. The database will include information on biology, limnology and hydrogeology of lakes.

A database with standardized ecological information on Icelandic lakes is a prerequisite for rational utilization and conservation of Icelandic lakes and freshwater resources.

Applied use includes advice in environmental impact assessment, aquaculture (e.g. selection of stocks), advice in fisheries (e.g. selection of gear, level of exploitation), advice for conservation of freshwater lakes, animals and plants, and a source for teaching at various school levels.

The database is a source and reference material for scientific research in the future.

A nation-wide database with ecological information will enhance scientific studies in the field of ecological pattern-analysis and other work of comparative-approach, e.g. questions pertaining to effects of environmental factors on the evolution and adaptation of freshwater organisms.

The database is to serve as a platform for ecological monitoring of 5-10 lakes, where key biotic and abiotic factors will be monitored 1-3 times a year at an interval of 1-3 years.

Material and methods

The ESIL-project focuses on freshwater lakes, but brackish and glacial lakes are also studied. There are approximately 1.850 freshwater lakes in Iceland larger than 0,1 km² and ca. 200 lakes larger than 1,0 km². The project started in 1992 and the database contains information of about 80 lakes $\geq 1,0$ km², distributed all over the country (Fig. 1., Table 1.).

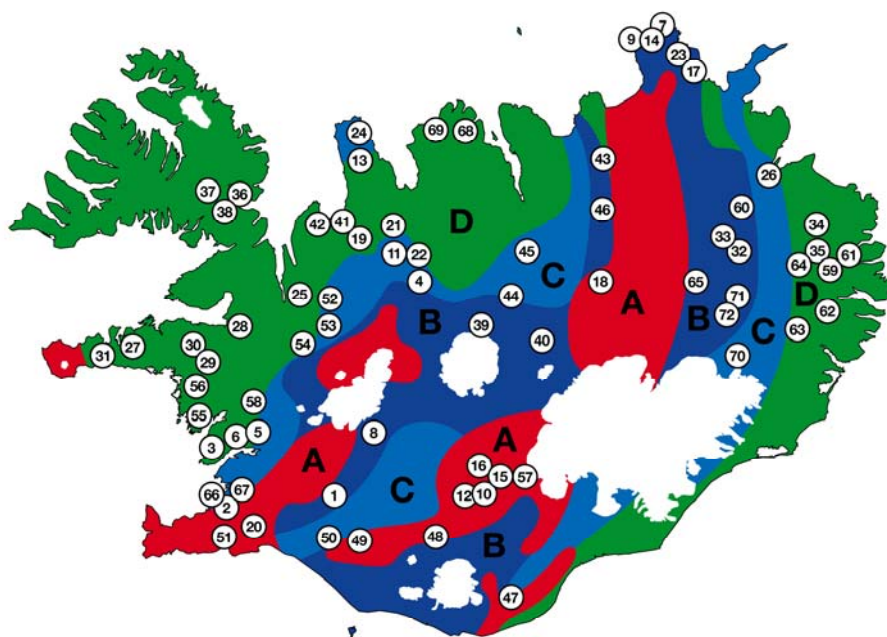


Fig. 1.

Sampling was performed in August each year. A prescribed protocol for sampling methods was followed in collection and recording of samples in the field.

For each lake the following material was collected and registered:

Hydrology – Geology

Geographical location (longitude, latitude), lake areal, depth (mean and max), volume, retention time, altitude, topographical form of lake basin, size of catchment area, type of bedrock in catchment area and type of geological formation of lake (external information sources in many cases).

Physiology – chemicals

Temperature, conductivity and pH measured at the surface on 3-4 sites (depending on lake size). Alkalinity, nutrients and major ions measured at 1 station (altogether 16 variables, incl. Total-P, Total-N and Total-organic C).

Biology –Plants

Vegetation sampled by dredge at 4-6 sites in lake. Digital information (% coverage) of type of vegetation in catchment area.

Table 1. List of lakes included in the ESIL-project. Data sampled and processed in 1992-2004. Numbers refer to codes attached to lakes throughout all datafiles.

1	APAVATN	41	HÓPIÐ
2	ELLIDAVATN	42	VESTURHÓPSVATN
3	EYRARVATN	43	LANGAVATN (ÞING.)
4	GALTABÓL	44	REYÐARVATN
5	GEITABERGSVATN	45	URÐARVATN SYÐRA
6	GLAMMASTAÐAVATN	46	MÁSVATN
7	HRAUNHAFNARVATN	47	FLJÓTSBOTN
8	HVÍTÁRVATN	48	FROSTASTAÐAVATN
9	KÖTLUVATN	49	EYSTRÁ-GÍSLHOLTSVATN
10	LANGAVATN	50	HESTVATN
11	MJÓAVATN	51	HLÍÐARVATN
12	NÝJAVATN	52	HÓLMAVATN/TUNGUK.
13	SELVATN	53	ARNARVATN STÓRA
14	SIGURÐARSTAÐAVATN	54	ÚLFSVATN
15	SKÁLAVATN	55	HÓLSVATN
16	STÓRA-FOSSVATN	56	SAURAVATN
17	STÓRA-VIÐARVATN	57	LANGISJÓR
18	SVARTÁRVATN	58	SKORRADALSVATN
19	SVÍNAVATN	59	LAGARFLJÓT
20	ÚLFLJÓTSVATN	60	ÞURÍÐARVATN
21	VATNSHLÍÐARVATN	61	HEIÐARVATN/Fjarðarh.
22	VESTRA-FRÍÐMUNDARVATN	62	SKRIÐUVATN
23	YTRA-DEILDARVATN	63	ÓDÁÐAVATN
24	ÖLVESVATN	64	SANDVATN
25	HÓLMAVATN/HRÚTAFJ.	65	ÞRÍHYRNINGSVATN
26	NÝPSLÓN	66	VÍFILSSTAÐAVATN
27	BAULÁRVALLAVATN	67	HAFRAVATN
28	HAUKADALSVATN	68	ÓLAFSFJARÐARVATN
29	HÍTARVATN	69	MIKLAVATN, FLJÓTUM
30	ODDASTAÐAVATN	70	FOLAVATN, HRAUNI
31	VATNSHOLTSVATN (V)	71	GILSÁRVATN, FLJÓTSDALSHEIÐI
32	ÁNAVATN	72	EYRARSELVATN, FLJÓTSDALSHEIÐI
33	SÆNAUTAVATN	73	SANDVATN SYÐRA
34	EIÐAVATN	74	SANDVATN NYRÐRA
35	URRIÐAVATN	75	GRÆNAVATN, MÝVATNSSVEIT.
36	ÞEÐRIKSVALLAVATN	76	ÍSHÓLSVATN
37	HÖGNAVATN	77	MÝVATN, BEKRAFLÓI
38	ÓNEFNT VATN	78	MÝVATN, KÁLFASTRÖND
39	ÁSBJARNARVATN SYÐRA	79	STAKHÓLSTJÖRN, MÝVATNSSVEIT
40	FJÓRÐUNGSVATN	80	KRINGLUVATN

Biology –Invertebrates

- i) *Shallow littoral zone*. Stone-samples. 4-6 stations around lake, 5 stones per station. Stones brushed and sieved through 250 µm. Quantified by measuring overhead projections of stones. Surface texture of stones graded according to degree of roughness (rough, medium, smooth). Identified (species, sub-orders) and counted.
- ii) *Sediment bottom*. Kajak-core. Midsection transect. 2-6 stations, 5 Kajaks per station. Sieved through 250 µm. Fixed with formaldehyde. Identified (species, sub-order) and counted. One Kajak taken at deepest spot for diatome analysis.
- iv) *Pelagic zone*. Quantified sampling of zooplankton (125 µm sieve) and algae (20 µm sieve) with a net-sampler. 2-6 stations, 3 hauls per station. Fixed with lugol. Identified (species) and counted.

Biology – Fish

Arctic charr, brown trout and Atlantic salmon caught with Jensen-gillnets (11-22 nets per lake, meshsize ranging between 12-60 mm) for 12 hours overnight. Threespined sticklebacks (*Gasterosteus aculeatus*) caught in traps. CPUE data registered, length and weight measured, otoliths taken for ageing, fleshcolour noted, parasites registered, sex and maturity stage noted. Samples taken from kidney for analysis of bacterial kidney disease (BKD). Samples taken from liver for DNA-sequencing. Photoslides taken of a subsample of Arctic charr for morphological studies, and heads with gills removed along with stomachs for later analyses on morphology and diet (identified to species and sub-orders and counted).

Data – Storing - Presentation - Publication

The database is unofficial until closing of the project, estimated to be in the year 2005. Use of data for scientific publication until then is restricted to founders/board of the ESIL-project and their partners. The database is a computerized SQL-server and GIS-based storage of all data obtained in the survey. The database will be accessible on the internet through website-connection and by use of search-machines. Rawdata of the ESIL-database will be processed to a variable degree, presented in strata according to different needs of users, e.g. the general public, the educational sector and scientists. The ESIL-database will be linked to other databases, containing related data, e.g. hydrological, geological and vegetational data. A large collection of invertebrates sampled in the ESIL-project is available for scientists for further examination and study.

Financing

The project has been financed by the participating institutes and by grants from the Icelandic Research Council, University of Iceland, the ministry of environment, the ministry of agriculture, Fiskiræktarsjóður and Landvernd.

If you need some more information about ESIL you are welcome to contact any member of the project-team listed on the first page.

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- Malmquist, H.J., Snorrason, S.S., Skúlason, S. & Guðbergsson, G. Ecological survey of Icelandic lakes 1992-1997: a standardized database. Poster and abstract presented at: *Nordic Benthological Meeting*. May 15.-16. 1995. Uppsala, Sweden. Department of Environmental Assessment, Swedish University of Agricultural Sciences. Uppsala, Sweden.
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- Erlín E. Jóhannsdóttir, Jón S. Ólafsson and Hilmar J. Malmquist. 2003. Community structure of chironomidae larvae in the surf zone of Icelandic lakes. Poster and abstract presented at: XV International Symposium on Chironomidae. University of Minnesota, Minnesota U.S.A. August 12-15, 2003.
- Hilmar J. Malmquist. Life history traits of Arctic charr and the lake environment: What is going on? Abstract. Presented at: NORLAKE Symposium, Silkeborg, Denmark, 18-21 October, 2003.
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- Martin Søndergaard, Erik Jeppesen and Jens Peder Jensen. Physico-chemical variables of NORLAKE-lakes: Changes along a climate gradient. Abstract. Presented at: NORLAKE Symposium, Silkeborg, Denmark, 18-21 October, 2003.
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- Hilmar J. Malmquist. Yfirlitskönnun á lífríki stöðuvatna. *Lesbók Morgunblaðsins. Greinaflokkur um Rannsóknir á Íslandi*. 13. apríl. 1996. Kynning á samstarfsverkefni Bændaskólans að Hólum, Líffræðistofnunar Háskólans, Náttúrufræðistofu Kópavogs og Veiðimálastofnunar.
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- Hilmar J. Malmquist, Gunnar st. Jónsson, Sigurður S. Snorrason & Kristinn Einarsson. 1999. Næringarefni í íslenskum stöðuvötnum. Útdráttur. Bls. 94. Í: *Líffræðirannsóknir á Íslandi*. Afmælisráðstefna Líffræðifélags Íslands og Líffræðistofnunar Háskólans. Hótel Loftleiðum 18.-20. nóvember 1999. Háskólaútgáfan. Háskóli Íslands.
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