



Networking Lake Observatories in Europe

Eleanor Jennings
Chair of NETLAKE

COST Action ES 1201

COST (European Cooperation in Science and Technology)

COST

- Europe's longest-running framework for cooperation in science and technology.
- Implementing scientific networking projects for over 40 years.
- Funds cooperative scientific projects called 'COST Actions'.
- Gives opportunity to embark on bottom-up, multidisciplinary and collaborative networks.

COST Domains

Quick Access

Domains

Actions

In Focus



Biomedicine and
Molecular Biosciences



Individuals, Societies,
Cultures and Health



Chemistry and
Molecular Sciences and
Technology



Information and
Communication
Technologies



Food and Agriculture



Materials, Physics and
Nanosciences



Earth System Science
and Environmental
Management



Transport and Urban
Development



Forests, their Products
and Services



Trans-Domain



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Why lake observatories?

COST Why lakes?

Examples of services



Water supply



Tourism, fishing



Aesthetic & cultural

- Lakes provide many services for the human population.
- But are vulnerable to a wide range of stressors.
- Subject to stringent regulation.
- Water Framework Directive.

Examples of environmental stressors



Water abstraction



Nutrient enrichment



Climate change

History of lake monitoring

COST Why lakes?



- Until recently monitoring relied solely on discrete samples, later analysed in the laboratory.
- Typically provide weekly to monthly resolution.

- Now possible to monitor many parameters automatically at high frequency using sensors on *in-situ* platforms or buoys.
- Provide web-based access to data.



Monitoring platforms



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Why lakes?



Typical monitoring station will have:

- Weather station
- Chain of temperature sensors
- Dissolved oxygen
- pH
- Turbidity
- Chlorophyll fluorescence
- All every 2-5 minutes.

Monitoring platforms

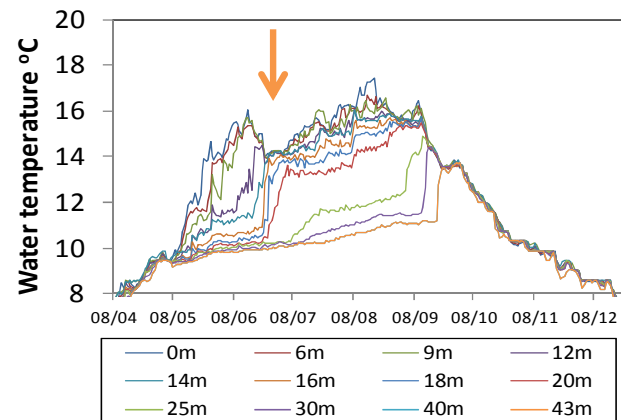
COST
Why lakes?



- Provide new insights into processes that drive change.

Typical monitoring station will have:

- Weather station
- Chain of temperature sensors
- Dissolved oxygen
- pH
- Turbidity
- Chlorophyll fluorescence
- All every 2-5 minutes.



History of NETLAKE

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Why lakes?

NETLAKE

Early monitoring
stations
established in EU
projects
1996 - 2000

EU framework
projects

REFLECT
(1998-2000)

CLIME
(2003-2005)



Map: Copyright European Commission



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GLEON – a global network of lake ecological observatories
established in 2005 (www.gleon.org)



Identified barriers to networking in Europe



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Why?

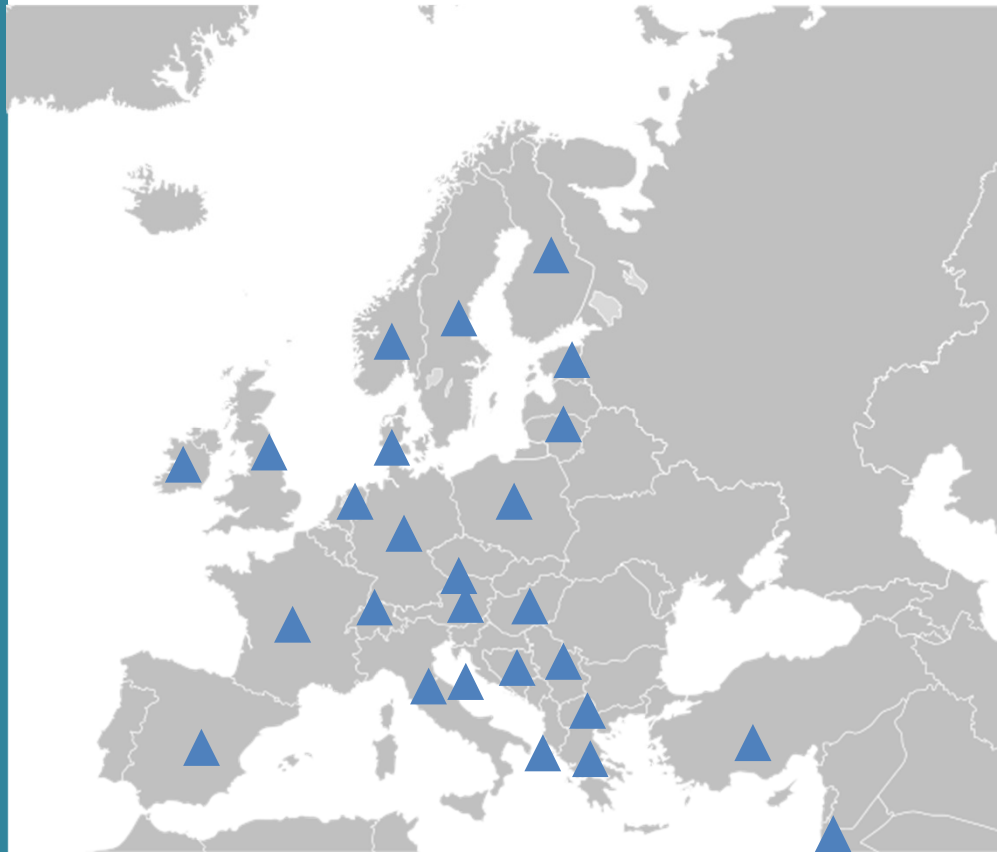
- A lack of information on the work at individual sites.
- A lack of standardisation in procedures and data processing.
- The lack of any platform for stakeholders to compare experiences and interact in Europe.
- Communication gaps between researchers and other endusers.

Action participants



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NETLAKE
Why?
Who?

NETLAKE kick-off October 2012; first science meeting January 2013



24 COST countries

Near-neighbour:
Albania

EU: JRC, Ispra

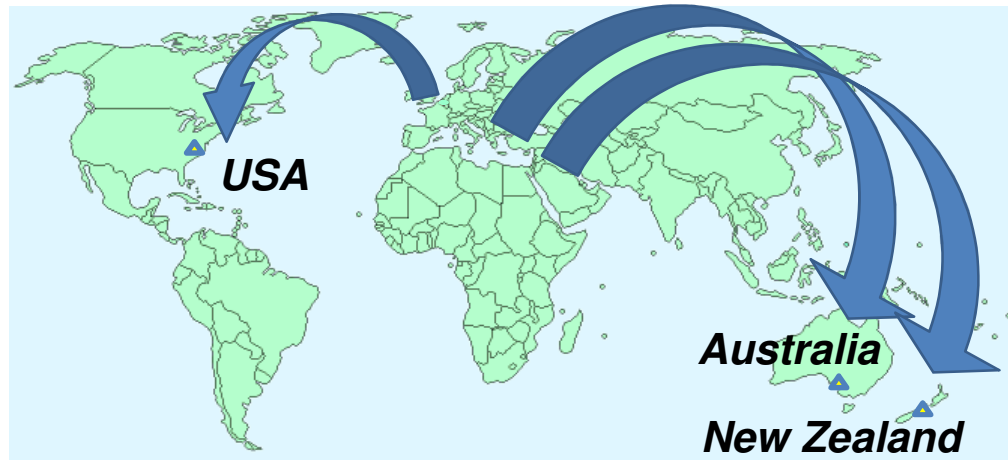
COST countries
sign up to
NETLAKE MOU

Non-COST participants

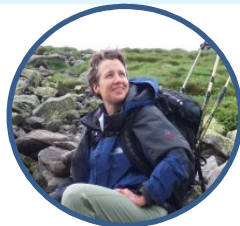


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Why?
Who?

Global networking



Justin Brookes
University of Adelaide



Kathie Weathers
Cary Institute

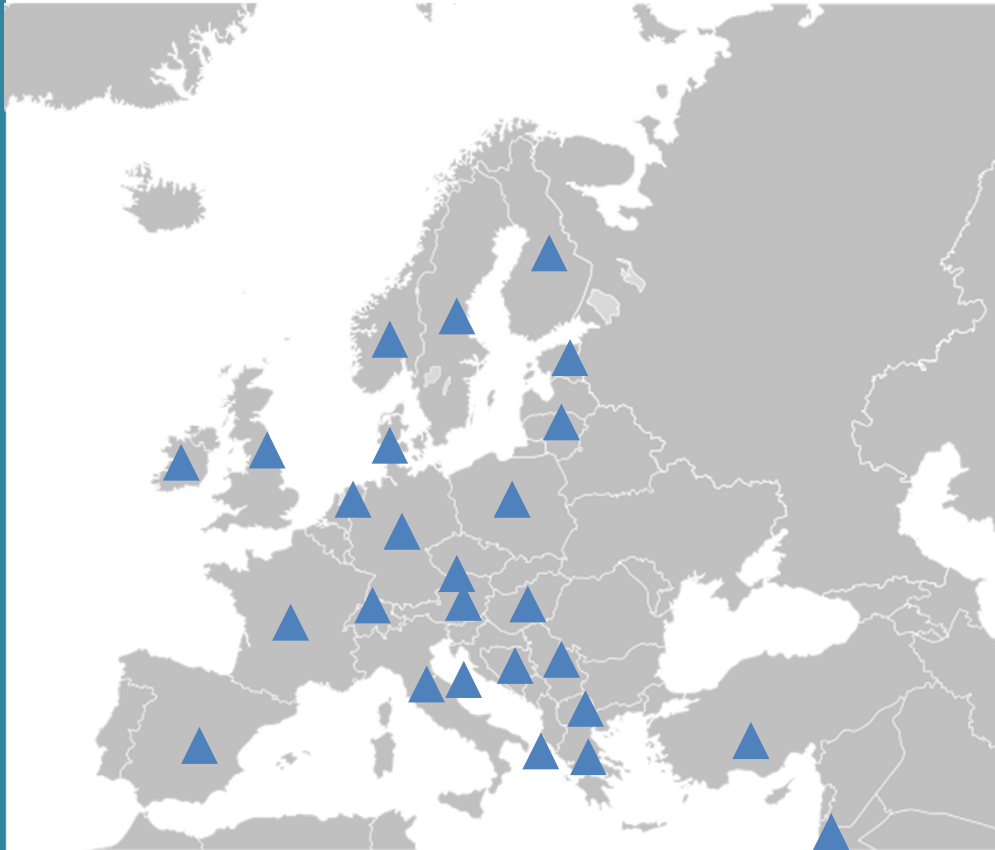


David Hamilton
University of Waikato

Action participants willing to share.



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Why?
Who?



Includes those with a wealth of experience in high frequency monitoring and interpretation of data and those new to this type of monitoring.

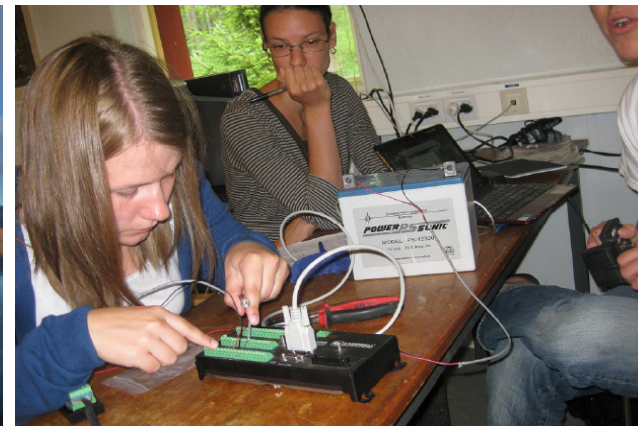
Willing to share this expertise.

Overarching aim of NETLAKE



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Participants
Why?
Aims

The overarching aim of NETLAKE is to build **a network of sites and individuals** that will support the development and deployment of sensor-based systems in lakes and reservoirs and promote the use of these systems to address both current and future water quality issues in Europe.



NETLAKE has five target groups

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Participants
Why?
Aims



Water managers



Scientists



European
citizens

Policy makers



Small
medium
enterprises

NETLAKE has five target groups



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Key aim is to bridge communication gaps



Water managers



Scientists



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citizens

Policy makers



Small
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NETLAKE time line



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Why?
Aims

	Phase 1		Phase 2				Phase 3	
	2013		2014		2015		2016	
Kick-off								
MC meeting	*	*	*	*	*	*	*	*
WG meetings	*	***	*	*	*	*	*	*
Training schools				1	2, 3		4	
Citizen science		*		*		*		*
Meta-database					*			
Final symposium								*

NETLAKE Structure

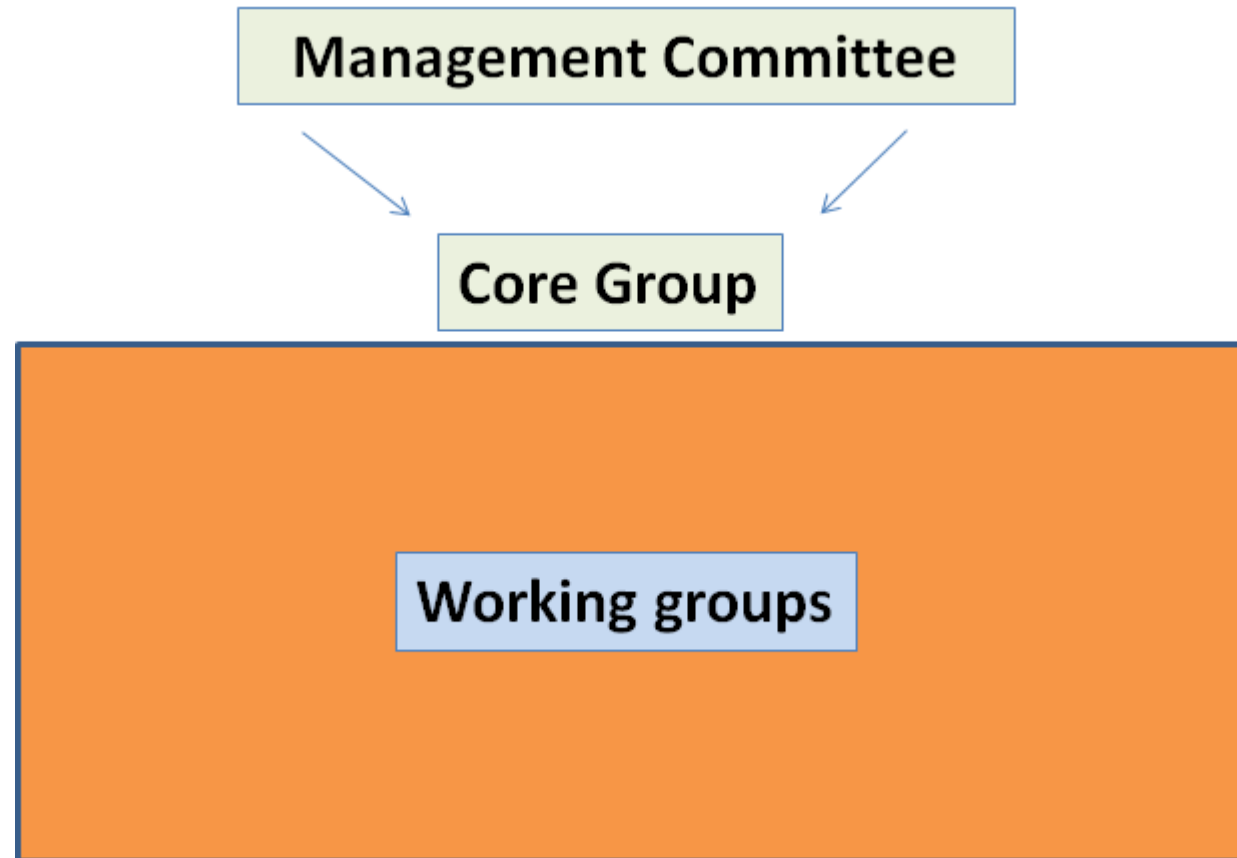
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Why lakes?
NETLAKE
Participants
Why?
Aims
Structure



NETLAKE Structure



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Why lakes?
NETLAKE
Participants
Why?
Aims
Structure



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NETLAKE structure

COST

Why lakes?

NETLAKE

Participants

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Structure

Research directions:

- **Five Working Groups:**
 - Two focused on data/tools.
 - Two focused on people.
 - One focused on communications.
- **Networking is at the core of NETLAKE**
 - MC includes representatives from five sectors.



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WG 1 - Data management

WG 2 - Data analysis and tools

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WGs



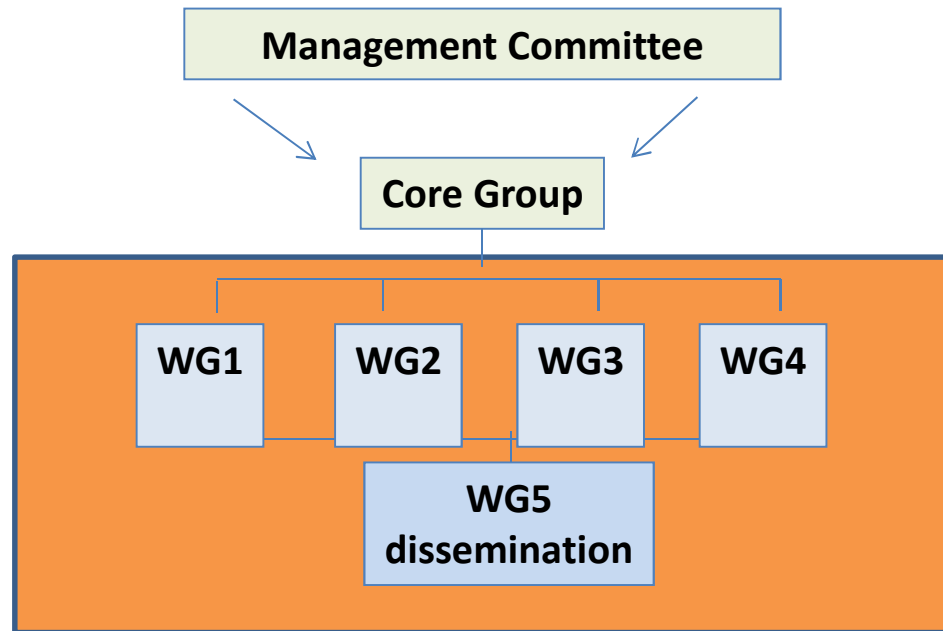
WG 3 - Citizen science

WG 4 – Management and policy



NETLAKE working groups

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Working groups

WG 1: Data acquisition and management

WG 2: Developing a toolbox of data analysis and modelling tools

WG 3: Developing a citizen science initiative

WG 4: Informing policy and management using lake sensor data

WG 5: Dissemination of NETLAKE outputs

Working group 1: data management and acquisition



Leaders: Alo Laas, Don Pierson Elvira de Eyto

Deliverables

- A meta-database on high resolution lake monitoring sites.
- Standard operating procedures and monitoring protocols.
- Data handling and QA/QC methodologies specific for these large datasets.

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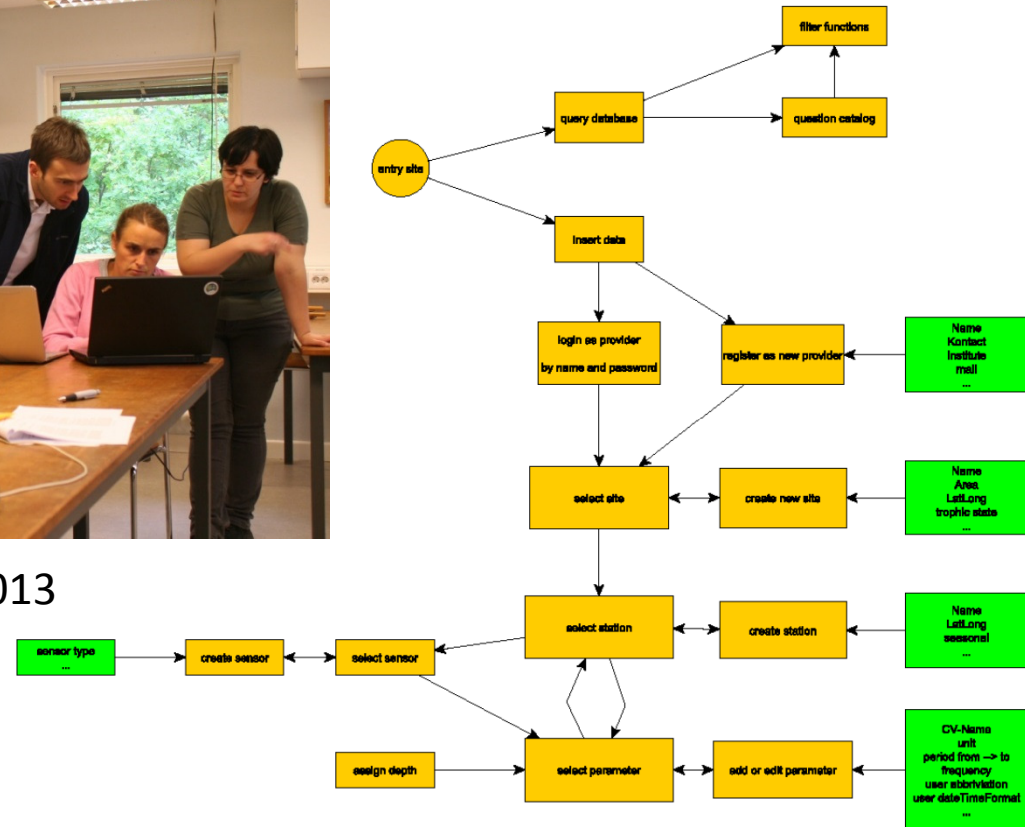


Working group 1: data management and acquisition

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WG 1 Erken 2013



Testing and will start populating in 2014

Working group 1: data management and acquisition

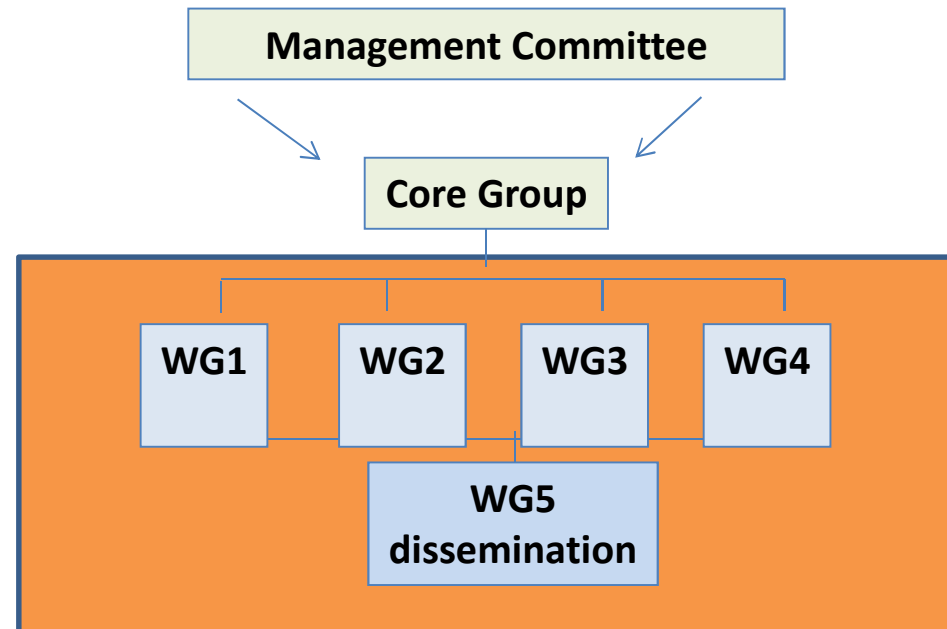
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First NETLAKE Training School
Erken Biological Station
Sweden
June 2014



NETLAKE working groups

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Working group 2: data analysis and handling



Working group leaders: Stephen Maberly, Peter Staehr

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Deliverables

- Collate and develop computer tools for managers and scientists to derive a series of lake attributes.
- Peer reviewed paper on the use of lake metabolism data in the management of lakes.
- Educational material for use by citizen science groups and educators.

Short-term Scientific Missions

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The screenshot shows a web browser window with the URL <https://www.dkit.ie/netlake/activities/short-term-scientific-missions>. The page is titled "Short Term Scientific Missions" and features a "Call for Short Term Scientific Missions (STSMs)" section. The left sidebar contains a "Menu" with links to Background, Action Details, People, Resources, Working Groups, Activities, Meetings, Short Term Scientific Missions, and Training Schools. Below the menu is a section titled "Networking Lake Observatories in Europe" with a description of the NETLAKE project and a logo. The right sidebar contains "Recent News" with headlines such as "NETLAKE STSM call announced", "First NETLAKE Science meeting February 2013", and "Lake Research Forum 15th February 2013". The bottom of the browser window shows the Windows taskbar with various application icons and the system clock indicating 16:34 on 12/02/2013.

Short Term Scientific Missions

Call for Short Term Scientific Missions (STSMs)

A number of grants for Short Term Scientific Missions (STSMs) are available within the NETLAKE COST Action. Funding can be sought for partial funding of research visits to host institutions. The goal of the research visits must be related to the NETLAKE COST Action. The Applicant should normally be engaged in a programme of research as a post graduate student or postdoctoral fellow or be employed in an institution of a COST Country having accepted the MoU of the Action. This institution shall be actively participating in the COST Action. The Applicant is responsible for obtaining the agreement of the host institution, before submitting his/her application.

Criteria:

- 1) Research subject must be relevant for NETLAKE.
- 2) The applicant and host must be from two different member countries.
- 3) STSM funding is a contribution towards travel and subsistence costs, and cannot be used as a salary.
- 4) Duration of research visit: from 5 working days to 3 months (6 months for Early Stage Researchers – see definition below*).
- 5) Maximum funding sum: €2500 or €3500 for long stays. More than

Recent News

NETLAKE STSM call announced

Short Term Scientific Missions provide funding to allow scientists to learn from an institution or laboratory in another COST co

First NETLAKE Science meeting February 2013

The first NETLAKE event in 2013 will be a two-day Management Committee/Working Group meeting in Dundalk Institute of Technology,

Lake Research Forum 15th February 2013

There will be a one-day Lake Research Forum held in Dundalk Institute

Working group 2: data analysis and handling



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- Iestyn Woolway (UK) hosted by David Hamilton, University of Waikato, New Zealand.
- Calculating components of lake surface energy budget into a Graphical User Interface and web based tool.
- Builds on the Lake Analyzer tool previously developed by the group and colleagues in GLEON



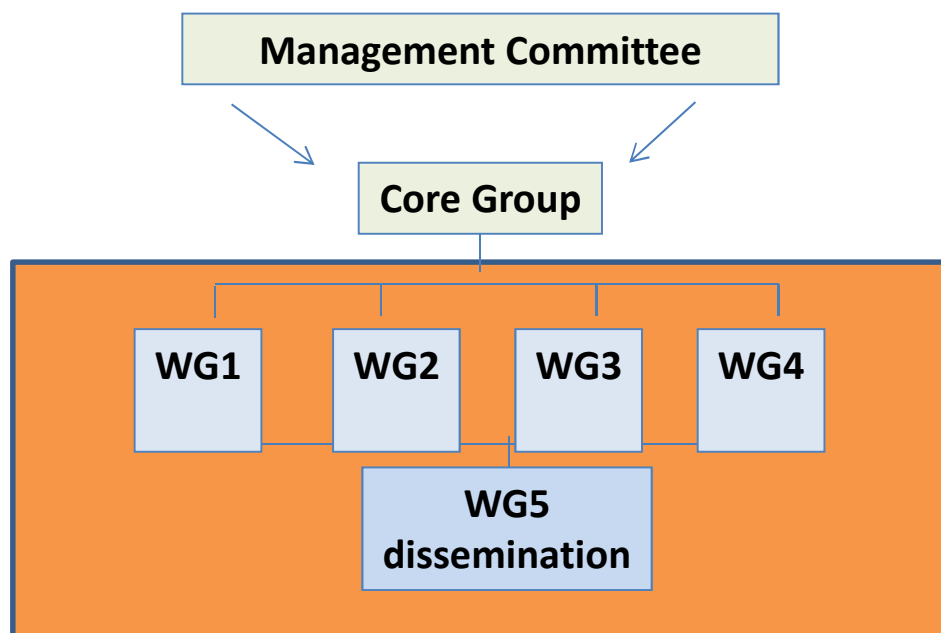
- Mikkel Andersen (Denmark) hosted by Stephen Maberly and Ian Jones, CEH, UK.
- Combine research in whole-lake metabolism with research in physical limnology.



- Rosana Aguilera, Catalan Institute for Water Research, Girona hosted by IGB, Berlin (DE), to work with Rita Adrian and David Livingstone.
- Coherence in lake temperature data using state-of-the-art time series analysis

NETLAKE working groups

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WG 5: Dissemination of NETLAKE outputs

Working group 3: citizen science

Lisette de Senorpont Domis, Stefan Bertilsson, Giovanna Flaim

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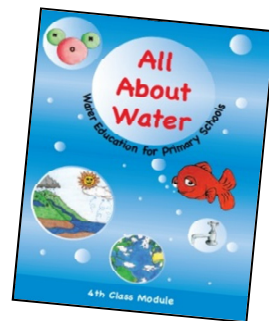
WGs



Assessing bathing water quality
Netherlands



Engaging coastal communities in the Baltic



Schools project Ireland



Engaging with
local
community
and farmers at
Loweswater



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Working group 3: citizen science



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Deliverables

- Schools based citizen science project.
- Citizen recorder project.
- Collated educational materials.

Working group 3: citizen science



Water Pals pilot project

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Water Pals

Do you want to know more about water and lakes?
Water Pals is a way to find out more, and to connect to schools in other countries at the same time! We have some fun [Water Challenges](#) for you to do.
Let's see how you get on.

[Our Water Challenges](#)

[Our lake photo gallery](#)

[About our schools](#)

[Learn about water and lakes](#)

NETLAKE **Water Pals** **COST**
EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY

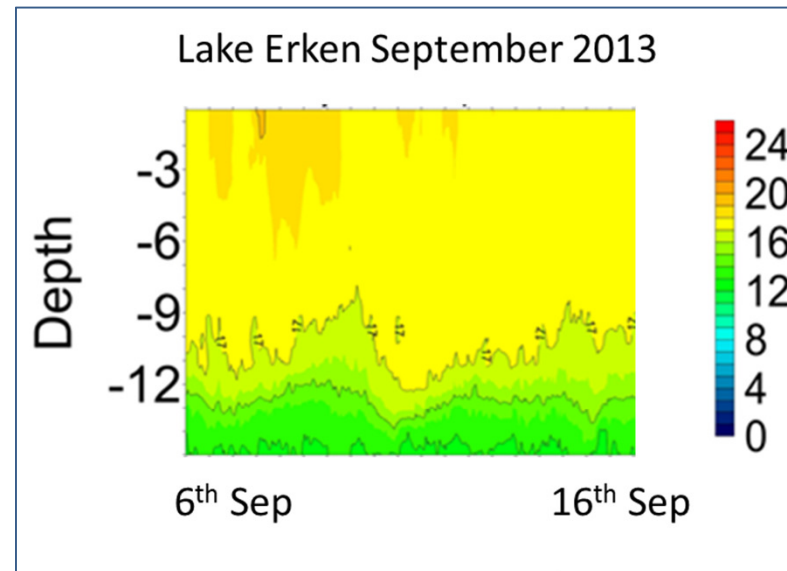
Water Pals is an output from EU COST Action NETLAKE ES1201

Working group 3: citizen science

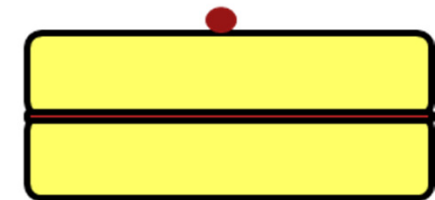


Water Pals pilot project

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Why do lakes layer
like cakes?



Working group 3: citizen science

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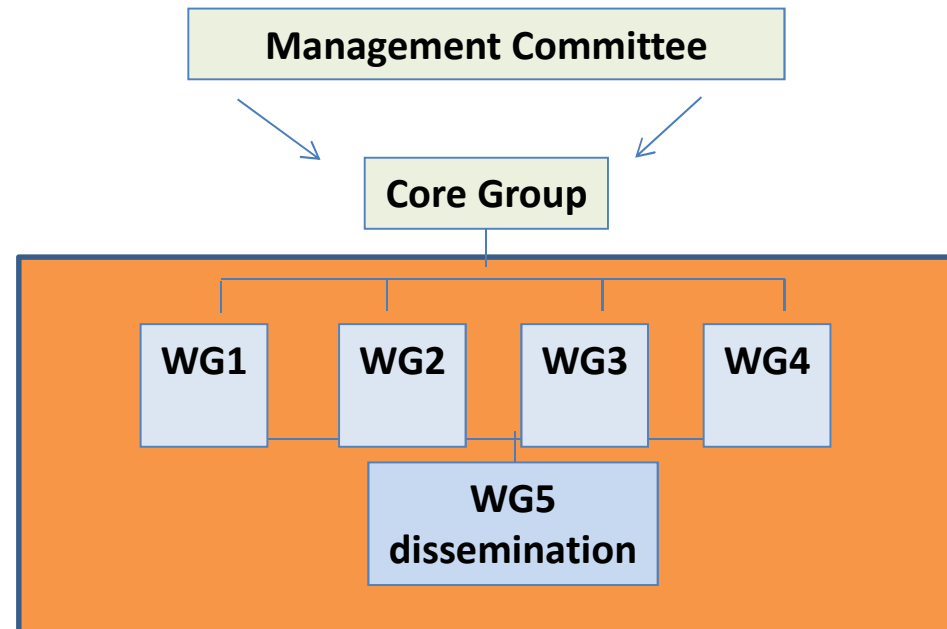


Public Outreach
Lake Balaton women's group

NETLAKE working groups



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WG 5: Dissemination of NETLAKE outputs

Working group 4: policy and management



Rafa Marce, Glen George

Deliverables

- Discussion forum on new developments in technology and management requirements.
- Report and peer-reviewed publication on the use of in situ sensor data to support the WFD.
- Set of Case Studies that demonstrate how lake buoys can support management.

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Working group 4: policy and management

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Netherlands 14/15 October

18 NETLAKE scientists

18 managers

Range of management areas.

- **Establish links**
- **Identify current applications**
- **Suggest future applications**



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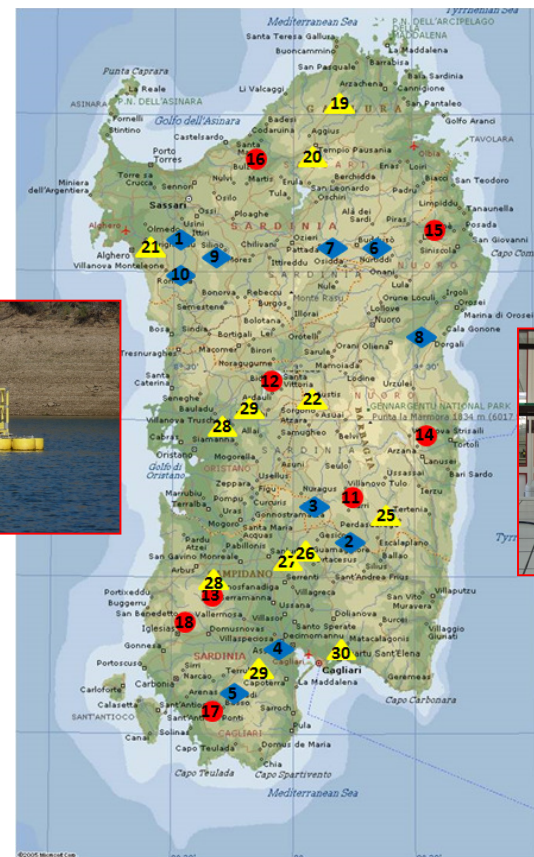
Working group 4: policy and management

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New links – Sardinia
Ente acque della Sardegna
Have instrumented
buoys on 18 reservoirs



Ente acque della Sardegna
Servizio Qualità Acqua Erogata
Limnologia degli Invasi

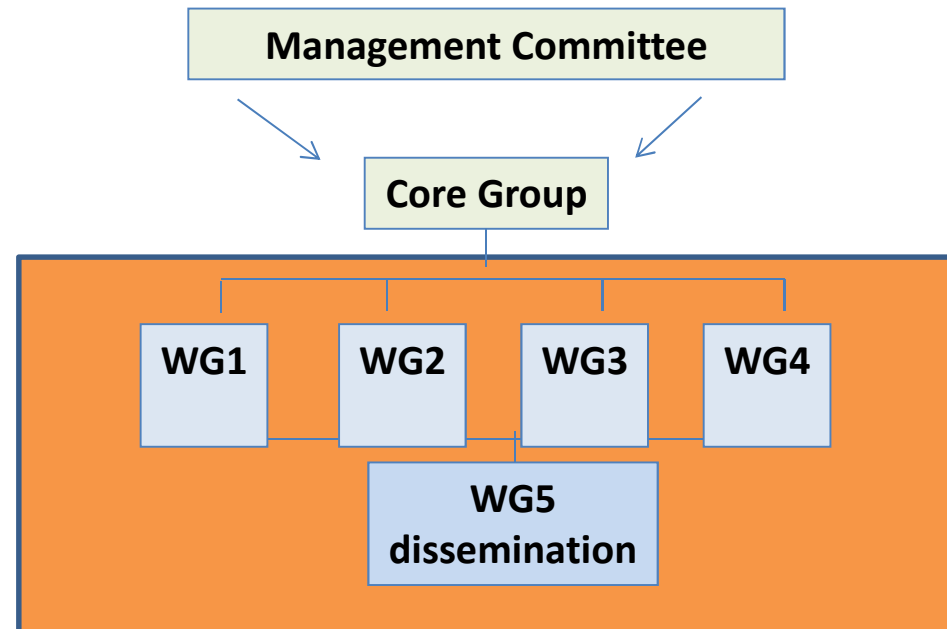


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NETLAKE working groups

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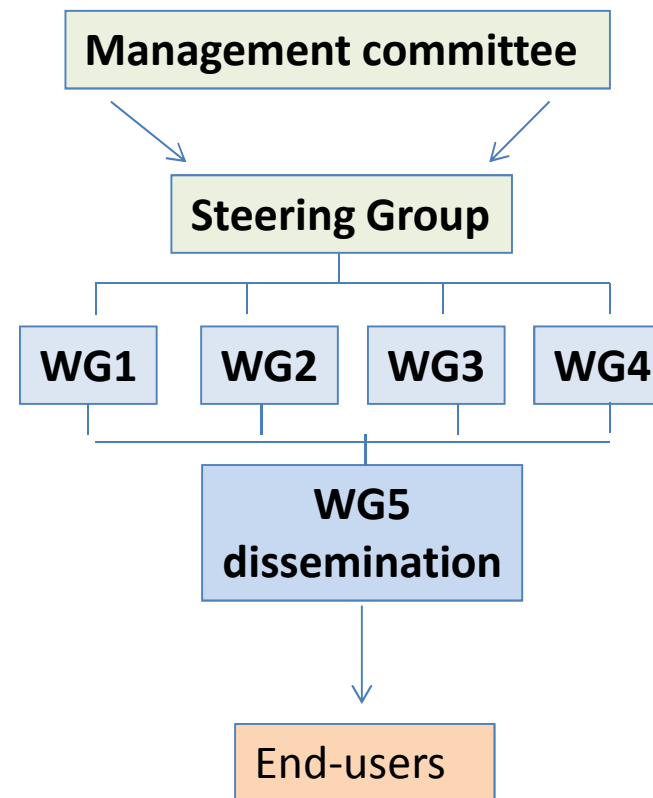
Working Group 5: Dissemination of outputs



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Deliverables

- Action dissemination plan.
- Action website.



Working Group 5: Dissemination of outputs



What?	Who?	How?
Meta-database	 <p>Scientists</p>  <p>European citizens</p>  <p>Water managers</p>  <p>Policy makers</p>  <p>SMEs</p>	Action website
SOPs and QA/QC methods		Workshops, Training Schools , Action website, Action symposium
Data analysis tools		Workshops, Training Schools , Action website, publications, Action symposium
Case studies		Workshops, Action website , Action symposium
Citizen science project		Citizen scientist Training Schools, Network , Action website
Educational materials		Citizen scientist Training Schools, Network , Action website
Website		www

Career stage and gender diversity

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Why?

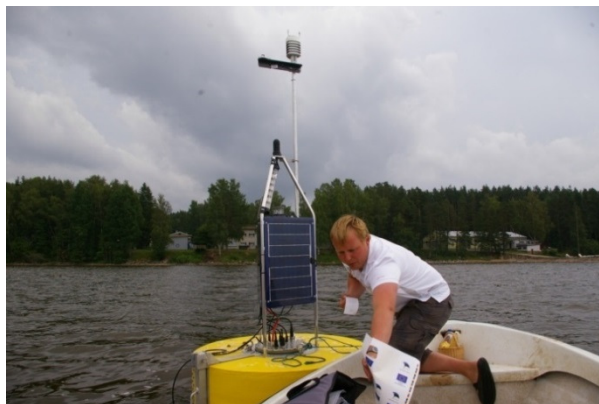
Aims

Structure

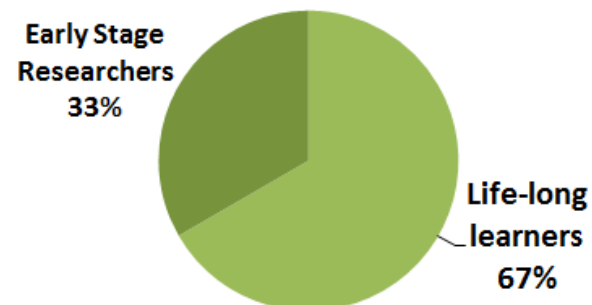
WGs

Diversity

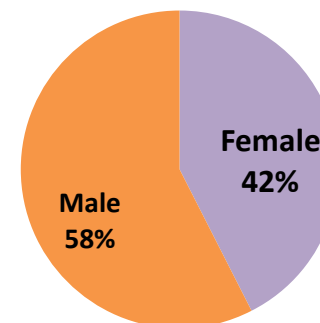
Early Stage Researchers
50% female, 50% male



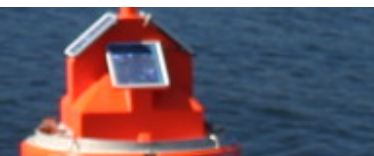
NETLAKE
Diversity in career stage



NETLAKE
gender balance



2014 and beyond



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Why lakes?
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WGs
Diversity
Future

	Phase 1		Phase 2				Phase 3	
	2013		2014		2015		2016	
Kick-off								
MC meeting	*	*	*	*	*	*	*	*
WG meetings	*	** *	*	*	*	*	*	*
Training schools				1	2, 3		4	
Citizen science		*		*		*		*
Meta-database					*			
Final symposium								*



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2014 and beyond



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Diversity

Future

- 2014 – Training School: grants to 20 trainees selected through application call.
- 2014 - eight STSMs – including coordinated STSMs focusing on case studies suggested by WG4 – management and policy:
- Call on www.netlake.org
- Expansion of NETLAKE MC – are COST countries not yet involved.
- Non-COST countries may also apply to join (non-funded).
- Possibility of drawing down funding for Reciprocal STSMs by S. Africa and Argentina.
- Individuals can become WGs members and attend meetings non-funded. Key WG members can also be funded on occasion.
- Contact: eleanor.jennings@dkit.ie
- www.netlake.org



Thank You

www.netlake.org