National Research Program

CLIMATE CHANGE IMPACT ON WATER ENVIRONMENT OF LATVIA

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UNIVERSITY of LATVIA

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Environmental studies have been adopted as a reserch priority for the first time in Latvia

Government decision No.412
Riga 16. June 2006.
On funding priorities in basic and applied research (2006 – 2009)

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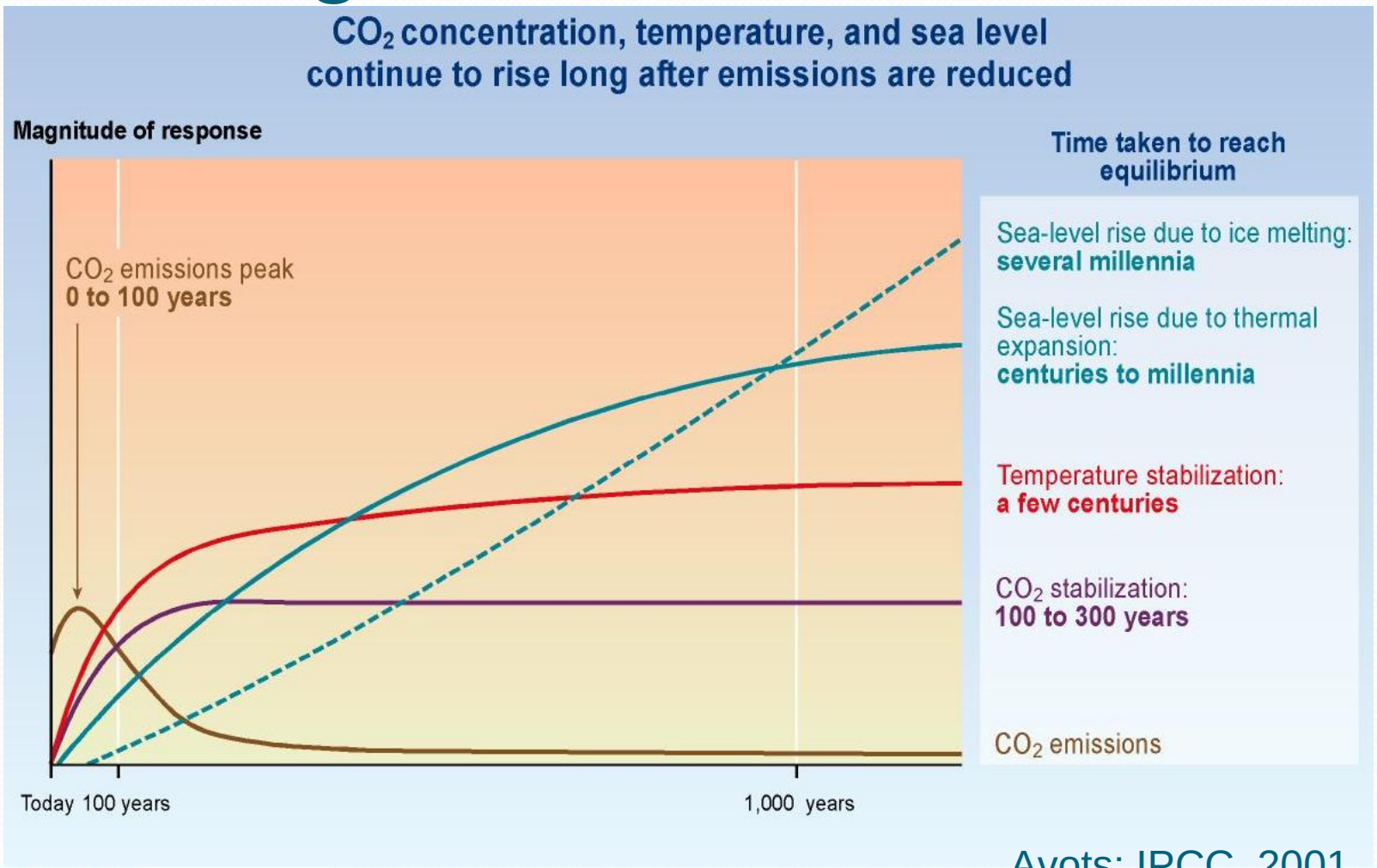
1. Agrobiotechnology (.....); 2. Biomedicine and pharmacy (....); 3. Energy (....);
4. Informatics (....); 5. Letonics (....); 6. Material reserch (....);
7. Forest research (....); 8. Medical research (....);

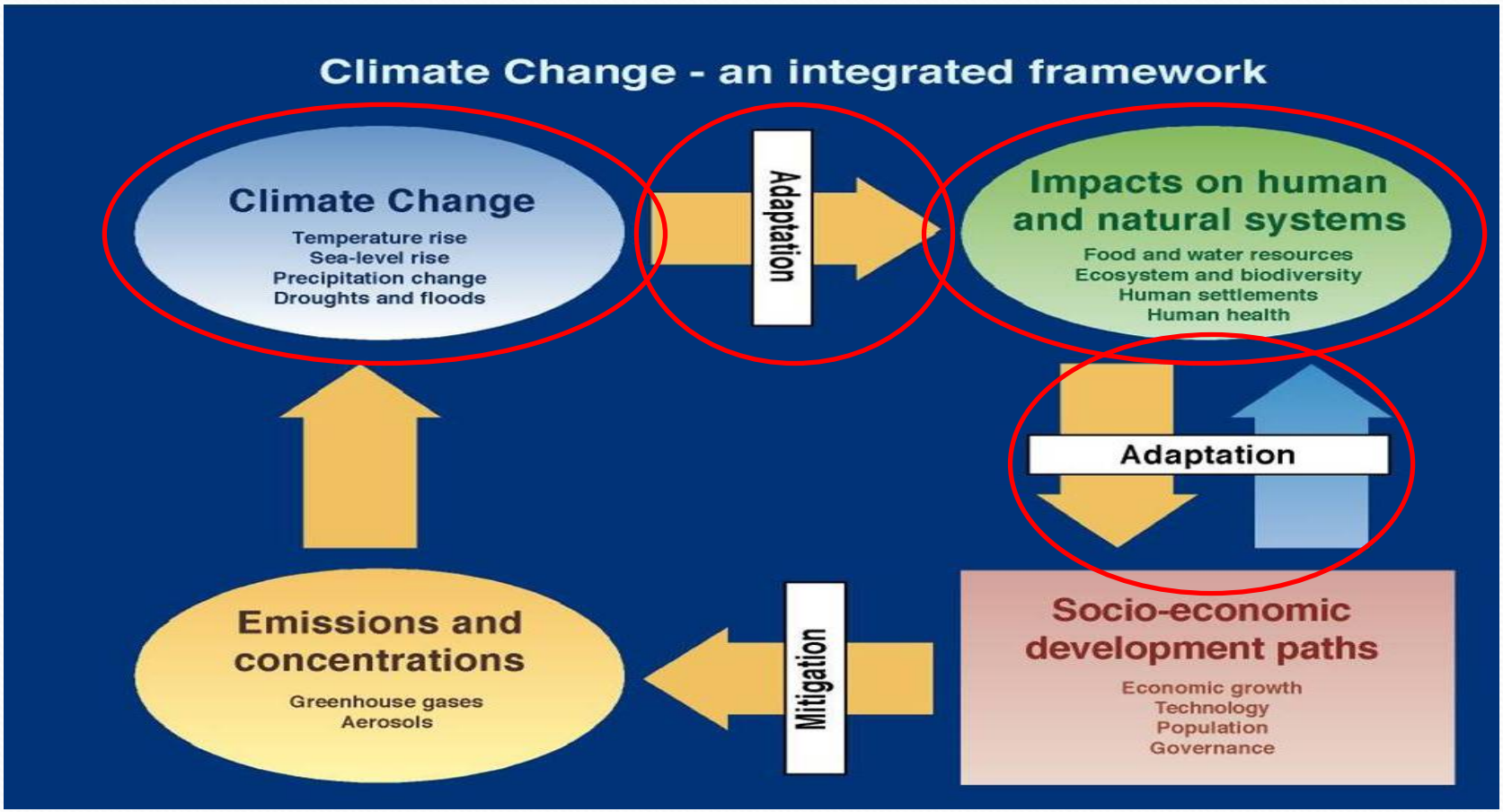
9. Environmental research – regional impact of climate change on water ecosystems and adaptation to [them], protection of the environment of the Baltic Sea and inland waters and sustainable management of their resources.

Climate change impact will be enduring



Avots: IPCC, 2001

Strategy: Predict and adapt



Source: IPCC, 2001

NRP "CLYMATE CHANGE IMPACT ON WATER ENVIRONMENT OF LATVIA" November 2006 – December 2009

Generic goal of the Program:

Assess short-, medium-, and long-term impact of climate change on the environment and ecosystems of the inner waters of Latvia and the Baltic Sea. Create a scientific basis for adaptation of environmental and sectorial policies of Latvia to climate change.

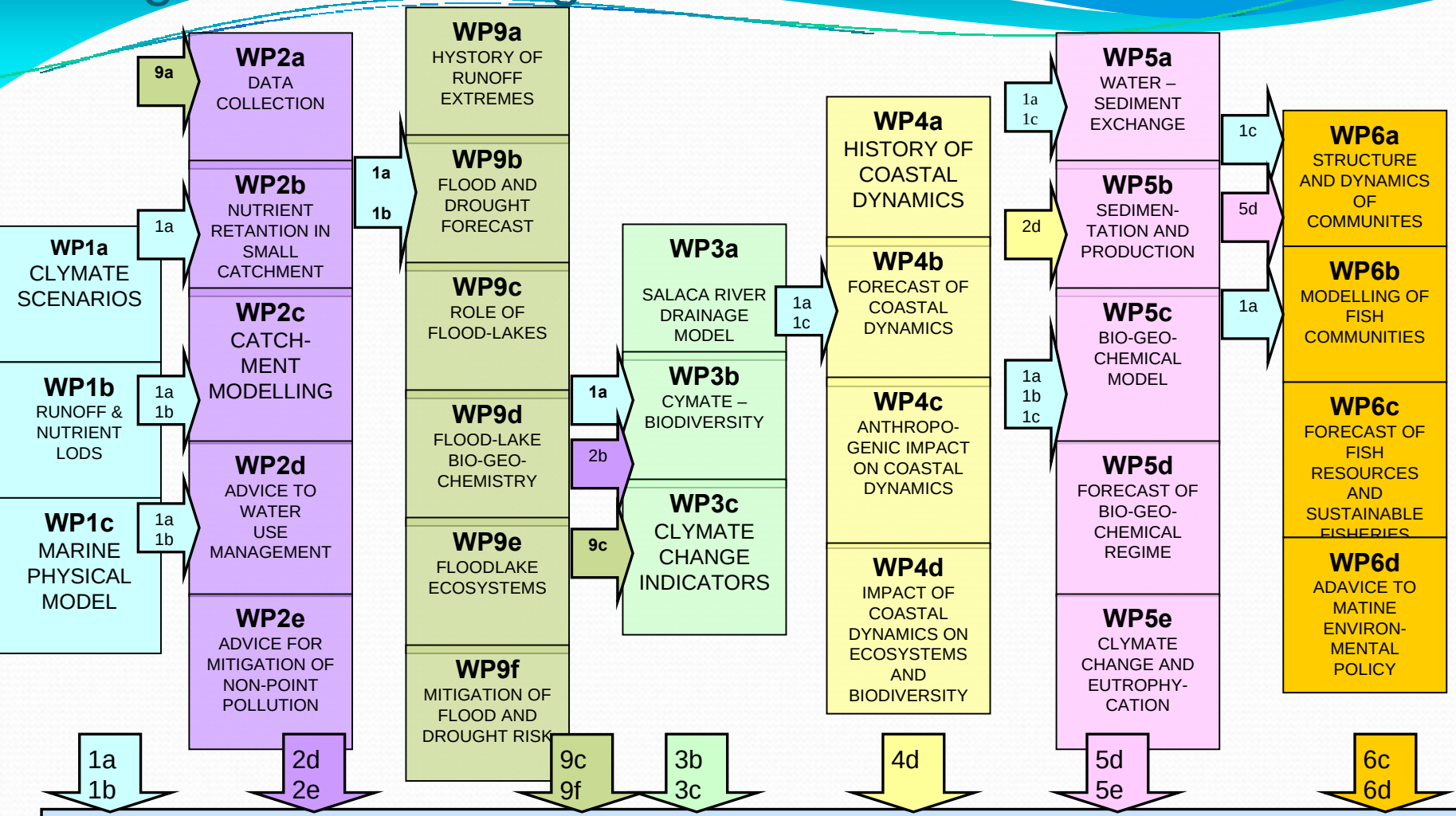
Specific goals:

a)Create several mutually non-controversal scenarios of the regime-determining parameters;

b)Assess possible climate change impacts on the quality inland waters of Latvia, their availability, flood and drought risk, to facilitate adaptation of the drainage basin management and secure protection and sustainable use of water resources ;

c)Forecast possible climate change impact on the physical regime, coastal dynamics, bio-geo-chemical regime, and ecosystems of the Baltic Sea, to facilitate protection of marine environmental quality, biological diversity, and sustainable use of its resources and services.

Program work is organized into 9 interlinked WPs



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VALSTS PĒTĪJUMU PROGRAMMA
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WP1
Climate change impact on runoff, nutrient flows, and regime of the Baltic Sea

WP1 Tasks

WP1a – Assess and adopt regional climate change models to generate data sets characterizing waterbody status with necessary temporal and spatial resolution.

WP1b – Forecast climate change impact on river runoff and its seasonal variation. Assess and model long-term runoff variation

WP1c – Adopt 3d marine physical models to produce datasets for projection of bio-geo-chemistry and ecosystem evolution.

WP1d – Provide modeling support to other WPs.

WP2
Climate change impact on nutrient turnover in the drainage

WP2 Tasks

WP2a – Collect and upgrade data for river modeling.
WP2b – Investigate nutrient retention processes in soil-field-dyke-river system.
WP2c – Select and adopt models of river hydrology and hydrochemistry applicable in conditions of Latvia. Forecast climate change impact on runoff and nutrient loading in 5 -6 characteristic agricultural drainages of various size.
WP2c – Assess usability and quality of quality of water resources. Assess forecast runoff variability till y. 2100. Forecast runoff extremes.
WP2d – Assess future change of agricultural non-point pollution in conditions of climate changes.

DP3
Climate change impact on freshwater ecosystems and biological diversity

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WP3 Tasks

WP2a – Assess changes in species diversity, analyze changes in composition and structure of fish community in river Salaca and Lake Burtnieku in relation to climate change factors.

WP2b – Characterize and forecast potential changes in water composition (leaching, wash-out, sorption, bio-geo-chemical cycles) and its impact on structure and function of freshwater ecosystems. Characterize changes in organic carbon cycles.

WP2c – Identify species suitable for bioindication – indicators of water quality and analyze trophyc relationships in freshwater systems (zoobenthos & aquatic vegetation > fish community).

WP4
Coastal processes

WP4 Tasks

WP4a – Asses the character and intensity of coastal geological processes during the 20th century. Identify dynamics of erosion and sand accumulation ones on shore and in shallowwater. Identify impact of hydro-engineering (harbors, coastal protection) on the coastal processes.

WP4b – Forecast possible changes in character and intensity of costal processes, and 30 – 50 y. dynamics of high risk zones in relation to fluctuation of hydro-meteorological conditions (wind regime, sea level etc.).

WP4c – Produce a map of nature protection areas (national parks, nature reserves, sanctuaries) under coastal erosion risk. Produce digital maps of coastal processes and projections for the purpose of spatial planning and coastal zone management.

WP5d – Assess possible adverse effect of coastal erosion and accumulation on marine ecosystems. Produce advice and prioritize actions necessary to protect endangered coastal stretches and support their sustainable use.

WP5
Bio-geo-chemical processes and primary production in the Baltic Sea

WP5 Tasks

WP5a – Experimentally identify border values of regime parameters causing abrupt changes in bio-geo-chemical processes in water-sediment interface layer.

WP5b – Identify relationships among primary producer dynamics, abiotic factors controlling sedimentation and vertical flux of matter, by means of a seasonal field observation.

WP5c – Apply forecasts produced by WP1 and WP2 and experimentally determined critical values (tasks WP5a, WP5b) to develop and calibrate bio-geochemical model of the Gulf of Riga.

WP5d – Forecast changes in the Baltic Sea environmental quality and productivity till 2100 by use of the devolved model.

WP5e – Advice on necessary adaptation and impact mitigation actions in accordance with projections of marine environmental quality and productivity.

WP6
Climate change impact on ecosystems and biological diversity of the Baltic Sea

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WP6 Tasks

WP6a – Forecast variations in species composition and population dynamics in the Baltic Sea in relation to climate change. Assess potential influence of climate change on food-web structure and thophic relationships of populations in the Baltic.

WP5b – Develop a long-term prognostic model to forecast fish growth, stock dynamics, and structure of fish communities based on climatic and human impact.

WP6c – Forecast fish stock dynamics and year-class strength within the identified periods of climatic regime, taking into account direct and indirect human impact: fisheries and eutrophication.

WP6d – Produce the advice for development and implementation of policy for sustainable management of marine living resources (mainly fish).

WP6e – Advice on development and implementation of WFD (coastal and transitional waterbodies of Latvia), EU maritime policy, EU Marine Strategy Directive, and the Baltic Sea Action Plan (HELCOM).

WP7
Adaptation of environmental and sectorial policy to the clymate change

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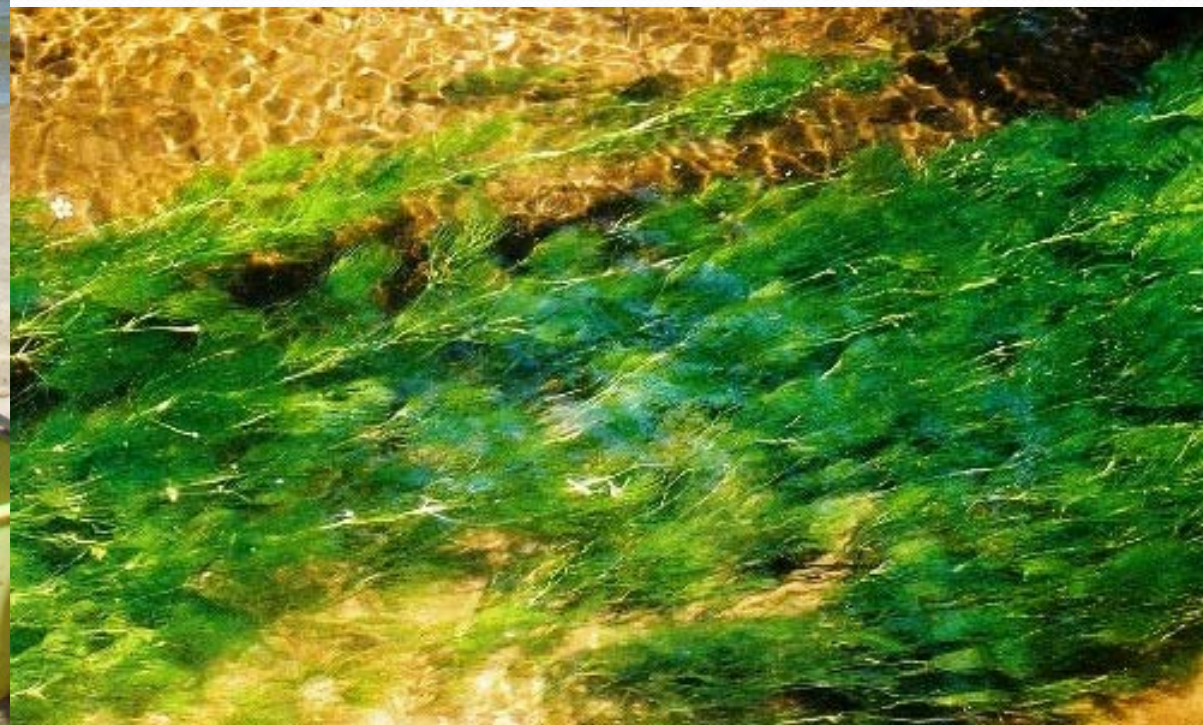
WP7 Tasks

WP7a – Conduce an analysis of the existing policy for adaptation to climate change impact on water environment of Latvia.

WP7b – Produce science-based advice for adaptation of national development planning, environmental policy, and sectorial policies to climate change and facilitate practical implementation of Program outputs.

WP7c – Facilitate dialogue between climate change and aquatic environment research teams and governmental and municipal professionals involved in development planning, and decision making, as well as the private business.

WP8
Program management and public outreach



WP8 Tasks

WP7a – Coordination of research, WP collaboration and everyday program management.

WP7b – Supervising efficient use of Program funds.

WP8c – Dissemination of Program outputs to broad public.

WP9d – Establishment and support to international Advisory Panel of the Program.

WP9e – Facilitating further development of national water environment research school.

PD8: Maintaining Program web-page

WP9
Impact of climate change on runoff extremes and areas influenced by floods and droughts

WP9 Tasks

WP9a – Assess historical and contemporary frequency and intensity of extreme runoff events in the climate change context.

WP9b – Forecast changes in drought and flood regimes based on scenarios of hydrological regime.

DP9c - Identify role of natural floodplains and flood-lakes as stabilizers of hydrological regime.

DP9d – Determine food and drought impact on bio-geo-chemical fluxes in flood-plain systems and the catchment.

DP9e – Assess the impact of floods and runoff minimums on flood-lake ecosystems of river Daugava.

WP9f – Advice on actions to flood and drought risk mitigation.

Program partners

University of Latvia
- Faculty of Physics and Mathematic: **WP 1**
- Faculty of Geography and Earth Science: WP 1, WP 2, **WP4**, **WP7**, WP8
- Faculty of Biology: WP 3, WP5, WP6, **WP8**

Latvia University of Agriculture
- Faculty of Rural Engineering: **WP2**

University of Daugavpils
- Faculty of Natural Sciences and Mathematic: **WP9**

Latvian Institute of Aquatic Ecology: WP2, **WP5**, **WP6**

Latvian Fish Resource Agency: WP3, WP6

UL Institute of Biology: WP 3, **WP5**, WP6

Program labour and costs

Around 95 researchers and research assistants are involved in implementation of the Program.

Expected total labour input is around 1260 person / month.

Funding is allocated from national budget on annual basis.

Altogether LVL 1,350510 (=EUR 1,929300) have been preliminarily earmarked for the Program.

From this amount LVL 75 000 (=EUR 108 143) are reserved for participation in BONUS ERA-NET+ Program in 2008 and 2009 (each).

www.kalme.daba.lv

Photos:
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Andris Soms
Ivars Putnis

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