

ACADEMY OF FINLAND



# Sustainable Governance of Aquatic Resources (AKVA)

RESEARCH PROGRAMME 2012–2016

Programme memorandum

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## FOREWORD

One of the key drivers behind the launch of the Research Programme on the Sustainable Governance of Aquatic Resources has been the 2007 evaluation of water research in Finland.<sup>1</sup> The overall assessment was quite positive, but the report also identified important areas of development among others in the field of basic research. In 2008, the Academy of Finland Research Council for Biosciences and Environment proposed that preparations be started for a Research Programme on the Sustainable Governance of Aquatic Resources. The proposal was based on a well-advanced plan that incorporated earlier proposals submitted to the Academy, the recommendations of the 2007 evaluation as well as recognised needs in society. Both leading scientists and civil servants had been involved in drafting the proposal.

At its autumn 2010 meeting where the agenda included approval of the Academy's operating and financial plan for 2012–2015, the Academy Board decided to grant negotiation authority for the preparation of a research programme in this field.

A working group was appointed in December 2010 to take charge of the preparations. The preparatory group was chaired by Professor Mari Walls (Research Council for Biosciences and Environment) and its vice chair was Professor Johanna Buchert (Research Council for Natural Sciences and Engineering). The other members of the preparatory group were Professor Mikael Knip (Research Council for Health), Atte Korhola (Research Council for Biosciences and Environment), and Erkki K. Laitinen (Research Council for Culture and Society). The Academy's Administration Office was represented by Senior Science Adviser Saara Leppinen, Science Advisers Jan Bäckman, Kustaa Multamäki and Kata-Riina Valosaari, Programme Manager Paavo-Petri Ahonen and Project Officer Melisa Huhtakangas.

Preliminary information on the Research Programme and its themes were released in 2010. The preparatory group and Academy officials received a position paper from the Joint Working Group on Large Lake Research at the University of Eastern Finland as well as comments from various other sources. Progress reports on preparations were presented among others to the International Water Sector Working Group<sup>2</sup>, the Tekes Water Programme and to the Finnish Water Forum delegation. The preparatory group met on five occasions and on 3 May 2011 organised an exploratory workshop at the Academy as well as a discussion forum for civil servants in this sector. The workshop attracted the attendance of more than 40 experienced scientists and experts in this field from some 20 organisations.

The Board of the Academy of Finland will make in autumn 2011 its decision on funding the Research Programme from the 2012 budget authority. The programme is scheduled to run for four years. Decisions on any additional calls under the programme will be made at a later date on the programme steering group's recommendations.

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<sup>1</sup> Water Research in Finland 2002–2006. International Evaluation (2008). Publications of the Academy of Finland 1/08.

<sup>2</sup> This is an informal working group composed of ministry officials responsible for water issues in their respective fields. The working group is convened by the Ministry for Foreign Affairs on an ad hoc basis to discuss important international events in the water sector and Finland's possible role in these processes.

## 1. BACKGROUND

Water research is a broad and wide-ranging field of study that is interlinked with a number of different disciplines and sectors. Indeed, water in general is an issue that cannot be addressed separately and in isolation, but it cuts across several other fields. In the environmental and societal context of water, a whole host of environmental, social, political and economic changes have a bearing on the state of the aquatic environment and on the availability and usability of water. It is also important to consider the cultural, health-related and safety and security aspects of water.

Finnish research in the water sector is very highly rated.<sup>3</sup> Nonetheless, there is a growing recognition of the need to strengthen interdisciplinary and transdisciplinary research. The Academy's latest assessment of the current state of science and research in Finland drew attention to the lack of conceptual, modelling- and problem-driven approaches to water research.<sup>4</sup> The same source also points out that water research has a crucial part to play in the environmental protection of waterways. "The challenge lies in the integration of ecology with water research and social research. Water as a natural resource, both as such and as a source of food and nutrition, is emerging as a politically important factor."

In the course of preparing this research programme, a number of arguments have been put forward that highlight the need to put the results of scientific research to better use. One area where water research is considered lacking is in providing evidence and support for informed economic decision-making, for instance in connection with assessing renovation needs in hydroelectric power plants.

All in all, both the research community and civil servants are clear about the growing need for multidisciplinary research. The societal impact of water research could be enhanced through closer networking among the research community and end-users of research results and through planning for collaborative research projects.<sup>5</sup> Furthermore, access to the information produced in research projects should be improved.

In addition to the early preparation of the research programme and comments received from the field, various policy papers and background reports have identified as drivers of policy orientations. Water protection policy is based upon a Government resolution<sup>6</sup> which identifies a few priority areas. The national water management implementation programme<sup>7</sup>, in turn, is a concrete plan under which these horizontal research and development areas can be directly or indirectly supported by Academy-funded research. The Research Programme also has potential points of contact with Strategic Centres for Science, Technology and Innovation in the environmental and biosector.<sup>8</sup>

The decision to allocate funding for water research is fully consistent with the policy adopted by the Academy Board to focus research attention on the major challenges facing society and humankind.

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<sup>3</sup> Water Research in Finland 2002–2006. International Evaluation (2008). Publications of the Academy of Finland 1/08.

<sup>4</sup> The State and Quality of Scientific Research in Finland 2009 (2009). Academy of Finland.

<sup>5</sup> Timo Kolu and Laura Valkeasuo (2009): Veden tutkimuksen yhteiskunnallinen vaikuttavuus (The societal impact of water research, in Finnish). Academy of Finland publications 3/09.

<sup>6</sup> Water protection: Policy orientations through to 2015. Government Resolution (2007) Finnish Environment (in Finnish) 10|2007, Ministry of the Environment.

<sup>7</sup> Water management implementation programme 2010–2015 (2011). Ministry of the Environment.

<sup>8</sup> Established in Finland since 2008, Strategic Centres for Science, Technology and Innovation (known in Finnish under abbreviation SHOK) are a new form of collaboration between businesses, universities and research institutes.

One of these challenges specified is the Nordic climate and environment. The Academy of Finland Research Programme on Climate Change (FICCA) also ties in with this same area.<sup>9</sup>

Environmental observation, measurement and monitoring as well as datasets and time series are an important part of the water research infrastructure. A dense network of research stations has contributed to strengthening environmental and water research. Internationally noteworthy projects include the EU's Life Watch and LTER/LTSER functions, which are aimed at improving the efficiency and international coordination of infrastructure use.

Apart from interests of developing national water research, it is important for the Research Programme to recognise the trends unfolding in the international operating environment. The International Strategy for Finland's Water Sector<sup>10</sup> identifies the improvement of water security as a key theme and single most important international objective for the Finnish water sector. Water security refers to the minimisation of risks related to the health and well-being of individuals or communities. A major player in the implementation of this strategy is the Finnish Water Forum, an umbrella organisation for key stakeholders in the Finnish water sector whose mission it is to promote Finnish water know-how internationally.

The requirements set out in the EU Water Policy Framework Directive<sup>11</sup> for a better scientific understanding of drainage basin processes gives a European dimension to the Research Programme. Practical implementation of this directive requires that mathematical predictive modelling is applied more extensively to studying drainage basin processes. This approach makes it possible to test the impact of different water protection scenarios and social policy frameworks.

One important platform for European research cooperation is the Joint Programming Initiative Water<sup>12</sup>, in which the Academy has been closely involved from the outset. The four thematic focuses of JPI Water are 1) bio-based economy, 2) sustainable ecosystems, 3) healthier water systems and 4) closing the water cycle.

The aim of the United Nations Water Decade 2005–2015 is to promote the attainment of the UN millennium development goals and the development of Integrated Water Resources Management (IWRM). The Water Decade activities are coordinated under UN-Water,<sup>13</sup> a multidisciplinary committee which coordinates the efforts of various UN organisations.

## 1.1 ECOSYSTEM SERVICES

A central focus of the Research Programme on Sustainable Governance of Aquatic Resources is on ecosystem services. This refers generally to the goods and services produced by the natural environment for humans (see e.g. Millennium ecosystem assessment<sup>14</sup> and Hiedanpää et al.<sup>15</sup>), but the concept of ecosystem services also underscores the interaction between ecosystems and humans (socio-economic systems). It complements the concepts of diversity and sustainable development that have earlier figured prominently in the field of natural resource governance. The term 'ecosystem services' stresses the importance of a multidisciplinary approach where the accent is on

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<sup>9</sup> See e.g. [www.aka.fi/ficca](http://www.aka.fi/ficca)

<sup>10</sup> International Strategy for Finland's Water Sector (2008). Ministry for Foreign Affairs, Ministry of Agriculture and Forestry, Ministry of the Environment.

<sup>11</sup> European Parliament and Council Directive 2000/60/EC establishing a framework for Community action in the field of water policy.

<sup>12</sup> See e.g. [www.era.gv.at/space/11442/directory/19937.html](http://www.era.gv.at/space/11442/directory/19937.html)

<sup>13</sup> See e.g. [www.unwater.org](http://www.unwater.org)

<sup>14</sup> The Millennium Ecosystem Assessment website: <http://www.maweb.org/en/index.aspx>

<sup>15</sup> Hiedanpää, J., Suvantola, L. ja Naskali, A. (toim.): *Hyödyllinen luonto. Ekosysteemipalvelut hyvinvointimme perustana*. 1. painos. Osuuskunta Vastapaino, 2010. ISBN 978-951-768-303-6

the identification of key ecosystem functions (economic, ecological, social, health-related, cultural) as well as their definition, evaluation, valuation and governance. In the water sector context, ecosystem services have to do with water and its ecosystem functions and end-products.

## 1.2 INTERDISCIPLINARITY

The Academy of Finland's research programme strategy says that research programmes are to promote interdisciplinary cooperation. The degree of interdisciplinarity can vary. Multidisciplinary research integrates knowledge and competencies from two or more disciplines or approaches them in parallel. The same subject is examined from different perspectives, or there is one common, broader perspective. However, those perspectives do not necessarily merge into one coherent end-result. An interdisciplinary approach involves closer and more intense cooperation. It integrates the methods and competencies of different disciplines and aims to achieve a coherent, synthesising end-result. Both multidisciplinary and deeper interdisciplinary cooperation contribute to creating dialogue between different disciplines. (See e.g. Huutoniemi<sup>16</sup>.)

Research projects selected for inclusion in the Research Programme on the Sustainable Governance of Aquatic Resources are expected to show at least a multidisciplinary approach. At the programme level, the aim is to promote interdisciplinary cooperation.

## 1.3 SCIENTIFIC RESEARCH IN THE WATER SECTOR IN FINLAND

The 2007 discipline evaluation mentioned earlier<sup>17</sup> provides a good overview of the extent of water research in Finland. In 2002–2006, there were more than 70 professors in this field, almost 180 senior scientists, almost 120 postdoctoral researchers and more than 300 doctoral thesis writers. However it is noteworthy that the evaluation did not cover all groups working in the water sector; water engineering research was one notable omission. The evaluation comprised 20 research posts funded by the Academy of Finland.

Academy funding for research in the water sector has been on the increase. In 2007–2010, funding from the Research Council for Biosciences and Environment totalled an estimated 26.5 million euros, and annual funding volumes have been rising.<sup>18</sup> Applications have been received in all fields funded by the Research Council. Total funding from the Research Council for Natural Sciences and Engineering in 2007–2010 was at least 2.9 million euros. In 2009, the Research Council for Natural Sciences and Engineering announced a targeted call on the subject of water engineering research. The Research Council for Culture and Society and the Research Council for Health have also granted funding to individual projects in the water sector. The Climate Change Research Programme (FICCA) awarded funding (2011–2014) to one consortium project and several consortium sub-projects focusing on water research.

Several doctoral programmes in Finland have at least some thematic interface with water research. The training courses and research projects organised under the Doctoral Programme in Integrated Catchment and Water Resources Management (VALUE) offer student places both for own doctoral students and other doctoral students. The Doctoral Programme in the Built Environment (RYM-TO) and the Finnish Graduate School in Environmental Science and Technology (EnSTe) both include themes touching upon water management and water engineering. The Graduate School in

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<sup>16</sup> Huutoniemi, K. (2010): "Tieteidenvälinen ympäristötutkimus" (Interdisciplinary environmental research, in Finnish). Frameworks for Interdisciplinary Environmental Analysis (FIDEA), Helsinki. [www.fidea.fi](http://www.fidea.fi)

<sup>17</sup> Water Research in Finland 2002–2006. International Evaluation (2008). Publications of the Academy of Finland 1/08.

<sup>18</sup> Funding for water sector projects from the Research Council for Biosciences and Environment is estimated by using keywords given in the Academy of Finland project database.

Environmental Health (SYTYKE) and the Doctoral Programme in Public Health (DPPH) also cover themes that tie in with the Research Programme, such as the safety of drinking water.

## 2. AIMS OF THE RESEARCH PROGRAMME

The main aims of the Research Programme are as follows:

- The Research Programme on the Sustainable Governance of Aquatic Resources supports scientific research that contributes to the sustainable management, adequacy and future safety of water and aquatic resources.
- The Research Programme contributes to enhancing the scientific standards of water research in Finland. The aim of the programme is to generate new, scientifically sound and relevant knowledge and to create and strengthen national and international networks that can help produce this knowledge. At the same time, the programme will aim to achieve significant social impact.
- The Research Programme integrates excellence from different disciplines. Projects selected for inclusion in the interdisciplinary programme are expected to adopt a systemic approach to their subject or at least include multidisciplinary perspectives.
- The aim is to research, analyse and synthesise the aquatic environment as a whole. The main focus is on the sustainable governance of aquatic resources with a view to securing the increasing future demand for water and the increasing needs for protection.

Additional programme objectives include the following:

- The Research Programme is aimed at furthering the national and international objectives of the Finnish water sector. It will aim to work as closely as possible with various national stakeholders.
- Practical implementation of the Research Programme depends upon contact and collaboration with doctoral programmes in different fields. The programme will create a thematic network to integrate all Academy-funded research in the water sector and provide a point of contact for external access.
- The Research Programme will foster cooperation with Academy of Finland partner countries and with countries that are best suited to research cooperation in the water sector. The aim is to achieve collaboration and exchange with research teams at the highest international level.
- The Research Programme will aim to distribute information widely about Finnish expertise and competencies in the water sector and to sharpen the profile of Finnish research.



### 3. PROGRAMME THEMES

The themes identified for the Research Programme are designed to create a coherent set of projects that will further the achievement of the programme's objectives. One of the driving principles behind the programme is interdisciplinarity, and all projects selected for inclusion will be expected to show a multidisciplinary approach. At its best, the programme will involve close collaboration between traditional water sciences (e.g. limnology, hydrology, water ecology), cultural research and social sciences (e.g. sociology, law and economics), traditional natural sciences (e.g. chemistry, physics, mathematics), health sciences (e.g. environmental medicine and public health) and engineering sciences (e.g. environmental engineering, process engineering and metrology).

The following cross-cutting themes are expected to figure prominently in the Research Programme, although it will not be required that they are incorporated in the research plan of every project:

- Integration of experimental process research and ecosystem modelling and modelling to support decision-making
- Social and societal impacts: valuation, policy analyses, risk management

All projects in the Research Programme will be encouraged to give special attention to questions of practical application and potential for application.

The three major thematic areas of the programme are:

#### 1. Pressures of change on aquatic environments and their management

Issues central to pressures of change include

- land use and planning, quality and adequacy of aquatic resources and water, burden placed on aquatic environments and values related to water use and changes in those values

Issues central to the management of pressures of change include

- policies, strategies and instruments of control and their effectiveness
- analytical and future-oriented risk management and systems-level analysis
- development of technologies

#### 2. Ecosystem services in aquatic environments and safeguarding those services

Issues central to safeguarding ecosystem services include

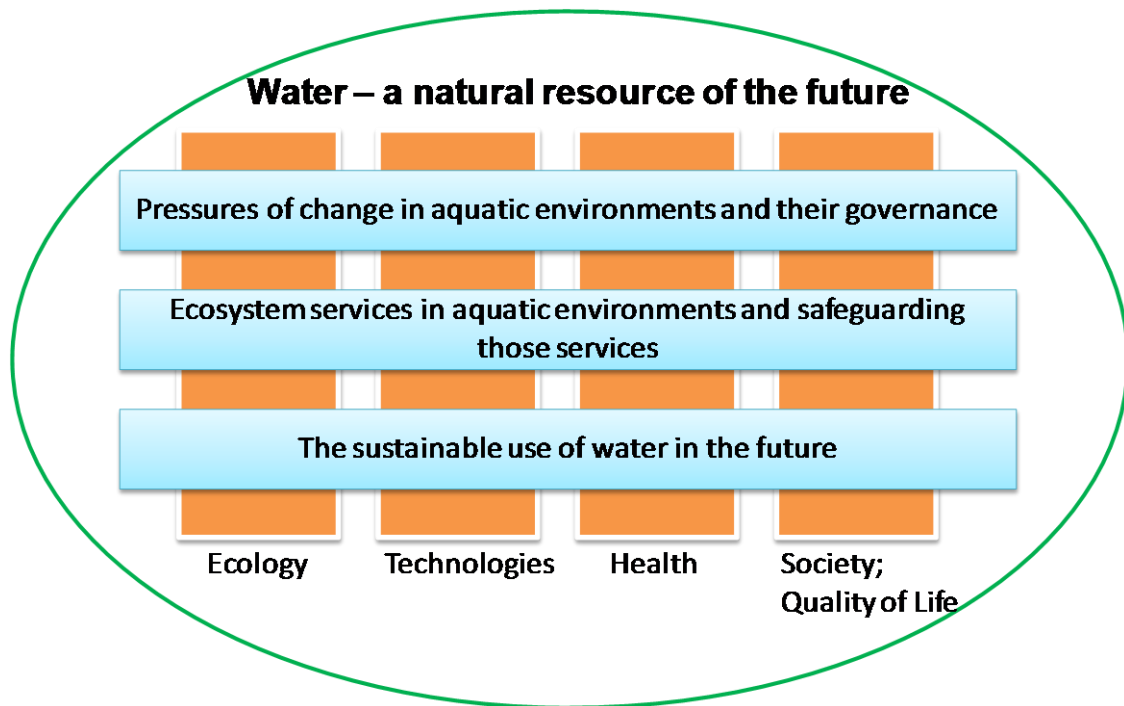
- identification of ecosystem services and understanding of the processes involved in producing those services
- ecosystem health and productivity
- rehabilitation of water ecosystems and development of biological purification processes
- sustainable use of products based on ecosystem services
- valuation of ecosystem services and related cost-benefit analyses

#### 3. Sustainable use of aquatic resources in the future

Issues central to the sustainable use of aquatic resources include

- systemic analysis of aquatic resources and water resources as part of the green economy
- economic connections to water ecosystem processes and water reserves
- connections of human health and environmental health with water and the quality and availability of water

- social impacts, power relations, institutions and policies related to the use of aquatic resources



**Figure 1.** Major themes of the Research Programme on the Sustainable Governance of Aquatic Resources and their interfaces with different disciplines.

Figure 1 illustrates the three main themes of the Research Programme and how they cut across and integrate the perspectives of the individual disciplines. In multidisciplinary and interdisciplinary research, a thematic area integrates the key skills and competencies of different researchers. Projects selected for inclusion in the programme are expected to submit research plans that are related to one or more of these thematic areas.

## **4. IMPLEMENTATION OF THE RESEARCH PROGRAMME**

This Research Programme is an interdisciplinary undertaking and cuts across the domains of all four Academy Research Councils: the Research Council for Biosciences and Environment, the Research Council for Natural Sciences and Engineering, the Research Council for Health and the Research Council for Culture and Society have all contributed to the preparation of the programme.

### **4.1 PROGRAMME FUNDING**

The Research Programme on the Sustainable Governance of Aquatic Resources (AKVA, 2012–2016) is funded and coordinated by a programme manager at the Academy of Finland. The programme is scheduled to run for four years, with funding provided from 2012 to 2016. The Board of the Academy of Finland will make its decision on programme funding in November 2011. The Academy provides funding for multidisciplinary research undertaken by research projects and research consortia. A research consortium is a collaboration of independent fixed-term projects working under a joint research plan in order to achieve greater added value than is ordinarily achieved from project cooperation. The first call announced under the programme will aim to reach 11–15 projects for funding, with an estimated combined budget of 11 million euros.

The Academy is considering opening discussions on funding cooperation among others with the Maj and Tor Nessling Foundation and various ministries.

### **4.2 NATIONAL COOPERATION**

The Research Programme on the Sustainable Governance of Aquatic Resources supports the Finnish National Water Programme (2008–2013). Furthermore, the Academy has close collaboration with the Tekes Water Programme (2008–2012).

Among Strategic Centres for Science, Technology and Innovation, water research could figure in the research strategies of at least Forestcluster Ltd, CLEEN Ltd and Rym Oy. Cooperation is also conceivable with other Strategic Centres.

### **4.3 INTERNATIONAL COOPERATION**

The Research Programme will aim selectively to build cooperation with research funding agencies in other countries that are committed to support high-level scientific research and that are recognised as interesting partners for Finnish water research.

The programme is planning to announce a second, international call in 2013. Partner countries that have been identified as potentially interesting with respect to research and cooperation in the water sector include Canada and the United States. The Academy of Finland and the Ministry for Foreign Affairs both provide funding for problem-driven and multidisciplinary development research (research on developing countries). In the next few years, annual calls for research grants for development research may be partly targeted at research in the water sector. In spring 2011, the Academy of Finland joined forces with the New Indigo ERA-NET project and the Indian Department of Science and Technology (DST) to announce a call for joint European and Indian research projects in the areas of wastewater management (incl. applications for industry and agriculture) and green chemistry applied to water purification (incl. drinking water purification). Any Finnish projects funded through this call will come under the umbrella of the current Research Programme.

Decisions on later international cooperation and on a possible second-stage call for joint international projects will be decided upon separately. Special attention will be given to JPI Water and its future activities.

#### **4.4 TIMETABLE**

The first, national call (i.e. call for letters of intent) within the Research Programme opens within the Academy's September 2011 call. The second call (i.e. call for full applications) will open in January 2012. The funding decisions will be made in spring 2012.

The Academy will fund individual research projects and consortium projects for a maximum of four years during 2012–2016. The funding period is four years, starting and it will start 1 June 2012 at the latest and ending 31 August 2016 at the latest.

The programme involves a two-stage call. The letter of intent to be submitted at the first stage includes a short plan of intent (see appendices to letter of intent at Academy's September 2011 call for applications, Appendix 1B). The deadline for submitting letters of intent is 30 September 2011 at 16.15. The deadline is non-negotiable. The programme steering group will make a proposal to the sub-committee on projects that on the basis of the letters of intent would best fit in with the programme's thematic areas and objectives. In the review of the letters of intent, the programme steering group will consult scientific experts. The projects selected to proceed to the second stage will be notified of the sub-committee's decision in early December 2011.

Applicants requested to submit full applications shall prepare a complete research plan and submit it in the Academy's online services no later than 15 February 2012 at 16.15. The deadline is non-negotiable. On the basis of the scientific review of the applications and considering the programme objectives, the programme steering group will prepare a proposal to the programme sub-committee on the projects to be funded. The programme sub-committee will make the funding decisions in spring 2012.

Any other international calls and joint calls will be carried out according to a timetable to be agreed upon separately with the funding partners.

#### **4.5 PROGRAMME STEERING GROUP**

The research programme is steered a steering group composed of the Academy's Research Council members and expert members. Other experts may also be invited to the steering group.

The composition of the programme steering group will be announced at a later date.

The duties of the programme steering group are:

- to prepare the programme and submit the programme sub-committee a proposal on projects to be funded
- to make a proposal to Academy Research Councils on any additional calls and/or additional funding
- to manage and monitor the programme
- to steer and support programme coordination;
- to plan and organise the final evaluation of the programme
- to promote the application of the programme's research results.

## 4.6 PROGRAMME COORDINATION

The research programme strives to support and promote the development of the selected projects into a coherent and cohesive structure through active information exchange and cooperation. Programme coordination is responsible for ensuring this development and works together with the projects to promote the attainment of the objectives set for the programme. The aim is to ensure that the projects reinforce each other and that the programme can generate new multidisciplinary research knowledge. Consequently, the principal investigators of the projects selected to take part in the programme will be required to commit themselves to the programme objectives and to cooperate actively throughout the programme and during programme evaluation.

The principal investigators of the projects taking part in the programme shall:

- assume responsibility for and report on the scientific programmes of the project and the use of the funds according to the instructions of the programme manager and relevant funding bodies
- see to that the whole research team attends all meetings, seminars and workshops organised by the programme coordinator and facilitate exchange of information and cooperation between the research teams in the programme
- take part in producing reviews, syntheses and information material around the research programme
- actively disseminate information about the programme's progress and results on public and scientific forums.

During the course of the programme, the research projects will participate in events arranged with end-users of the research results and in any other activities designed to provide information to stakeholders.

The steering group and the programme manager appointed by the Academy of Finland are responsible for programme coordination. A project officer from the Academy will act as secretary to the steering group.

## 4.7 FINAL EVALUATION

The implementation and results of the research programme will be evaluated upon programme completion. The implementation of the evaluation will be planned in detail as the programme progresses, but the evaluation is likely to consider at least the following aspects:

- attainment of the programme objectives
- programme implementation (coordination, role of the programme steering group, participation in the programme)
- evidence of impacts pursued by the programme
- national and international cooperation
- publicity and visibility of research conducted within the programme.

The evaluation may be carried out as part of more extensive evaluation of several Academy research programmes together or of national programmes, and in cooperation with other national actors.

The research teams receiving funding are required to report on the progress of their projects on an annual basis in accordance with the decision of the programme steering group, and to submit a research report to the Academy of Finland upon project completion. The reports shall include information on, for example, scientific publications produced and theses and doctoral dissertations completed within the programme.

## 5. MORE INFORMATION

This programme memorandum is available on the Academy of Finland's website at [www.aka.fi/akva](http://www.aka.fi/akva).

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