MISTRA
THE FOUNDATION FOR STRATEGIC ENVIRONMENTAL RESEARCH

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invitation

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Future Forests — Sustainable Strategies under Uncertainty and Risk

Mistra invites applications to establish a research programme in collaboration with users

1. INVITATION TO SUBMIT PRE-PROPOSALS

In a globalized world, in shifting market conditions and with a changing climate, society must adopt more flexible and enduring strategies. This applies particularly to the use of forest resources and management of forest ecosystems. Approaches that meet new sustainable commercial as well as management challenges are essential.

Mistra's vision is that future generations, too, should enjoy opportunities to build prosperity on a forest landscape with an ample capacity to provide goods and services — a diversified future forest landscape that is rich in resources in a broad sense. To fulfil the vision, Mistra invites applicants to build a research platform that engages users in generating new ideas, knowledge and practices. Mistra expects a successful applicant to look beyond the immediate future and consider how forests should be prepared to meet long-term requirements, 50 to 100 years from now. This call therefore supports novel approaches and new forms of collaboration.

Mistra seeks to promote sustainable development. One way is by investing in collaboration, aimed at solving major environmental problems, between researchers and users. Mistra offers grants for addressing such problems through bridge-building research. Such bridges link various research disciplines, on the one hand, and academic research and practical applications on the other. Practitioners in Swedish companies and public agencies, legislators, international negotiators and non-governmental organizations (NGOs), as well as researchers in different fields, can all be involved in research programmes funded by Mistra. Researchers and practitioners from other countries, too, can participate alongside their Swedish counterparts. In this call Mistra foresees collaboration and cofunding from industrial and other stakeholders.

Mistra now invites submission of expressions of interest on the theme of *Future Forests — Sustainable Strategies under Uncertainty and Risk*. Submissions should be in the form of strategic research pre-proposals, i.e. summaries of proposed Mistra research programmes.

Overall, the key features of Mistra programmes are their

- potential for solving major environmental problems
- value to intended users
- world-class scientific quality

- capacity to make Sweden more competitive
- contribution to Mistra's overall programme portfolio
- creation of strong research environments
- sound management and good organization.

Mistra endorses flexibility in terms of size and duration, with programme design appropriate for the task concerned. This call is for pre-proposals for a research programme designed to run for one or more phases, which last normally four years each. Mistra's contribution to the annual budget may be in the range of SEK 5–15 million, and cofunding from other sources is also expected. Mistra's investment will be adjusted to a level that it deems appropriate to the tasks formulated in the proposal, and which is comparable to the cofunding.

There are two stages in applying for Mistra grants:

- submission of a brief (max. 15-page) pre-proposal (open to all comers)
- submission of a full programme proposal (by invitation from Mistra only).

To facilitate interaction between researchers and users, Mistra can cover planning costs for the selected pre-proposals up to a maximum of SEK 300,000.

Pre-proposals for Mistra research programmes must be received by Mistra not later than 4.00 pm on 11 October 2007.

Instructions to readers
The purpose of this call for applications is not to provide an all-embracing or detailed description of what a 'Future forests' research programme should contain and how it should be designed. Rather, it is intended to open up for creative thinking and planning of a new research initiative. It covers a complex area and the perspectives are many. There are undoubtedly neglected issues that deserve attention in a research programme; conversely, some issues mentioned may be excluded or viewed differently by the applicants. Mistra believes strongly that many important new and exciting research questions have yet to be generated in encounters among scientists of various disciplines, not least the social sciences and humanities, on the one hand and various users on the other. Mistra therefore endorses the drawing-up of proposals at the intersection of science, policy and practice. Merely supplementing existing research approaches is not enough to meet the challenges that lie ahead. New transdisciplinary approaches are required.

Preparations for the call
The ideas expressed in this call derive partly from experience of previous Mistra programmes, but chiefly from a planning process involving a range of stakeholders, including representatives from the Swedish Forest Industries Federation, individual forest companies, the Swedish Federation of Forest Owners, research councils and national agencies. The agencies involved are the Swedish Forest Agency, Swedish Environmental Protection Agency, Swedish Energy Agency, Swedish Agency for Innovation Systems (VINNOVA) and Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas). Also a representative for the Forest-based sector Technology Platform has participated. Ideas have also been obtained at a workshop with some 50 invited users and scientists and from six background reports (available online, in Swedish, at www.mistra.org: *Rapporter*: *Sex omvärldsanalyser om framtidens skog*). The wording of the call text is the responsibility of Mistra alone, but it has been commented on by an advisory panel including international scientists, industrial users, forest owners, agencies and others.

2. CONTENTS

3.1 New challenges

Our still growing realization of the magnitude of the climate issue, its consequences and the action required will in all probability have a massive impact on society generally, probably for the rest of this century. Conditions for forest management may change radically. In parallel, society is greatly affected by the consequences of globalisation and of rapid economic development in parts of the world with large populations. A successful application in response to this call must consider these conditions as a starting point.

On this foundation, the aim is to find scientifically based solutions that take into account the knowledge and needs of different users, including the forest industry, national and international policymakers, small landowners and the general public — especially people whose everyday life is closely connected to the forest landscape. Simultaneously, the solutions sought should include cutting-edge research on the prerequisites for resilient forest ecosystems, including maintenance of ecosystem services, preservation of vulnerable species and development of efficient forestry practices for future corporate competitiveness.

Mistra expects novel and innovative research aimed at tackling the challenges ahead, rather than continuation of ongoing initiatives.

3.2 Competing needs and conflicting values

One central question is how to meet rising demand for wood raw material. Another is whether it is possible to find new ways of managing the forest landscape that maintain or increase economic output while also reinforcing ecological and social values.

This call aims to merge the two current paradigms of 'sustained-yield forestry' and 'species-oriented nature conservation' with the paradigm of 'ecosystem services', and to place them in a broader human perspective. This requires new transdisciplinary approaches beyond traditional forest research – including critical mass of social science and humanities. It is essential to define the new research challenges in cooperation with users who have different objectives. Mistra wants to promote further development of the competitiveness of both existing and new business opportunities based on forests as a renewable natural resource. At the same time, we seek further development of nature conservation, ecosystem services, and ethical and cultural values in the forest landscape.

One dilemma with a crucial bearing on this call is the conflicting claims of different stakeholders on the landscape. Together, these claims add up to well over 100%. It is therefore essential to provide scientifically based information, tools and advice to assist a range of corporate, public and individual stakeholders in handling land-use conflicts that emanate from diverging economic, ecological and social objectives, interests or claims on the forest landscape. A programme should address both how society could achieve a well-informed balance among different stakeholders' claims and how practices can be developed that satisfy several claims simultaneously. The future is, of course, almost impossible to predict. Nonetheless, decisions on how to manage forest resources and prevent future land-use conflicts must be taken. Thus, a solid understanding of ecosystem dynamics and forest utilization, past and present, is essential. Sound management

strategies to deal with future changes that are currently unknown should include both 'state-of-alert' readiness and freedom to explore different pathways.

3.3 Change and adaptability

Another core aim of this call is to develop sustainable strategies for managing the forest landscape that are based on the notion of dynamic change, rather than stability, in socioeconomic as well as natural systems. Here, climate change is a notable element. As we face an increasingly turbulent and changing world, partial erosion of the very foundation on which forestry today rests is a real risk. This call is thus based on the assumption that greater flexibility is needed to handle more rapid and unpredictable future changes in both natural and socioeconomic systems. This applies to the commercial aspects of forestry, as well as the ecological and cultural aspects of the forest landscape. It is assumed that, to increase competitiveness, the forest industry needs to be in the forefront of new product development and to contribute to a sustainable society. Accordingly, forestry must be flexible and diverse to be able to provide the resources needed for such new products.

The forester's familiar dilemma is the uncertainty of planning in a 100-year time frame — from seedling to harvesting. This, combined with the uncertainties associated with changes in global markets and the climate, is a challenge of this call. A timescale of 50–100 years is therefore suggested. Foreseeing the future use of forest resources and adapting forestry accordingly will give a competitive advantage.

4. THE STRATEGIC RESEARCH AGENDA

4.1 Synthesis and implementation

Mistra expects a successful application to include a strong core function including both synthesis and implementation. This core function should aim to advance academic theory and, at the same time, develop user-relevant information, solutions and practices. A combined synthesis and implementation function should command a critical mass of academic resources in a range of disciplines, including the social and natural sciences and the humanities. Also important is a capacity for processing multi- and transdisciplinary information in systematic ways, for example by modelling and system analysis. A capacity to deal with both quantitative and qualitative data is required. Mistra anticipates world-class competence in this function, and endorses international recruitment of leading experts.

Equally important is the function of organizing user involvement, including information dissemination and implementation. The users, representing economic, ecological, social and cultural aspects, should be involved in framing the research questions in cooperation with the scientists. They should follow the research and successively implement its findings. Mistra foresees a dynamic and multidirectional rather than a linear process.

The synthesis and implementation function of the programme should base its work on a clear grasp of what knowledge is needed to develop alternative sustainable models for future forestry that maintain ecosystem resilience. This idea should be continuously elaborated both by scientists and by a range of stakeholders representing various claims on the forest landscape. There must also be clear plans for putting this new knowledge into practice.

Within the synthesis and implementation function, interaction and exchange of information and ideas from a number of supportive thematic subprojects (see suggestions below) must be designed to meet the purposes of the programme levels and functions alike. The subprojects could, of course, be involved in user dialogues as well. Relevant ideas and information not produced within the programme should also be considered. Mistra therefore encourages collaboration and alliances with other strategic research projects in Sweden and abroad. See section 5 below.

In addition to the synthesis function, Mistra foresees a number of more specific, thematic subprojects. Mistra emphasizes that the justification for all these subprojects, i.e. how they contribute to the programme as a whole, must be made clear. Mistra endorses a few high-quality and highly relevant subprojects, each with critical mass, rather than many small, divergent subprojects. Consequently, there may be aspects mentioned in this call that are not realistic to cover within the programme. The subprojects can take various forms: Mistra does not specify a particular way of organizing an undertaking but, rather, encourages innovative solutions. However, the themes described below serve as a guide to what Mistra believes to be important aspects to cover.

4.2 Market and land-use changes

Global market aspects

The Swedish forest industry constitutes 10–15% of the production value of Swedish industry. The annual withdrawal of wood from Swedish forests is some 75 million m^3 (solid). Approximately 10% is used directly for energy production, 30% for sawmill or plywood production and 60% for the wood-fibre industry, mainly pulp and paper. Together, timber and pulp make up a mutually supportive platform for the present-day Swedish forest industry, and this situation has been fairly stable for some time.

New forest industry investments are currently taking place in regions of rapidly developing global markets and in areas where trees grow faster than at Nordic latitudes. The picture includes Russia, which utilizes only some 20% (approx. 100 million m^3) of its wood-production potential at present. At the same time, demand for wood raw material from large and rapidly expanding markets, such as China and India, is soaring. Perspectives on possible future global supply and demand are essential if credible models for tomorrow's forestry are to be created.

Recently, there has been a significant increase in attention paid to bioenergy, as an alternative to fossil fuels in the transport sector and for other energy purposes. Stiffer competition for wood raw material will affect the existing pulp and paper industry. Calculations and scenarios concerning possibly new, emerging wood markets; demands for different purposes; associated economic development, etc are thus desirable.

This call may comprise research, including scenario development, on issues representing both opportunities for and threats to the use of wood raw material from Swedish and Nordic forestry, in a global and regional perspective and both in the short and the long term. The rapidly growing global economy is highly likely to entail growing worldwide demand for wood raw material.

Land value and consequences for land use

The global rise in demand for resources entails new interest for productive land. Patterns of land ownership are changing in response to the increasing importance of agricultural and forest land. Changes in the strategies of international investors may significantly influence the magnitude of future investments in Sweden's wood-related industries. In these changing social and economic environments, there will probably be conflicts among the goals and expectations of different user groups, including transnational corporations, in terms of international laws and conventions, national economic and conservation priorities, local concerns, and appropriate forestry goals and practices. Finding constructive solutions to these conflicting expectations requires careful attention to the goals and needs of each category of users, the institutions available to solve problems, and the ways in which information and plans are shared among user groups.

Land prices also reflect a combination of different values. In Sweden, starting in the south, people are prepared to pay a constantly rising price for forest land. It exceeds the expected long-term economic output from traditional timber and wood-pulp production. Other values, such as hunting, recreation and a desirable rural lifestyle, are adding to the value that may be explained by wood production alone. A shift in values may be under way.

Increasing non-wood demands

Forests provide a variety of ecosystem services, from timber to aesthetic experience. They are also part of the regulation of hydrologic and climate systems, and their biodiversity is high. Future forest management should therefore allow for these values to be maintained.

As well as a source of raw materials for industry and the home of a wealth of organisms, forests are also cultural landscapes. The cultural identity of people in the Nordic countries and its expressions in lifestyle, literature, art, music, food, etc is based to a high degree on a close relationship with the forest landscape. Other considerations that are relevant to the future use of forests are successive social changes, including a growing urban population and depopulation of the countryside, but also more immigrants changing traditional ways of life.

Besides the economic values of the wood, forests are arenas for other business operations or for activities that represent combined recreational and commercial value for many people. Examples are tourism, hunting, fishing, reindeer herding, picking of berries and mushrooms, and a range of other outdoor and sports activities. Today, some of these already represent significant economic value, but also a value in terms of improved human health and public welfare. The legal right of access to private land (*allemansrätten*) is a key phenomenon in this context. Tourism, in particular, is an expanding industry in Sweden and the forest landscape — both its natural and cultural aspects — is an important asset in its further development.

All these non-wood, 'soft' aspects and values of the forest landscape are vital to include in overall scenarios, modelling and synthesis of future forest use. Mistra regards them as indispensable aspects of a research programme. Management and governance practices that exclude them are unrealistic. Research in this area must rely heavily on innovative research in behavioural and social sciences.

Climate change and adaptation

In 50 years from now the annual average temperature in Sweden may be 1.5–3°C higher than it is now. Winter precipitation may be 30% higher and summer droughts may be more frequent,

especially in south-eastern Sweden. Ground frost may be less common and forests may be more sensitive to winter storms. For climatic reasons alone, average annual tree growth could then increase by 20% — most of it in the northern half of Sweden. These are all examples of the possible effects of climate change. Besides gradual shifts in the annual averages of various parameters, climate change also entails more extreme and sudden events. Such disturbances to the system may have more far-reaching consequences than in the past, and they may also be more difficult to predict.

Rapid climate changes also entail adaptation consequences for natural ecosystems. Evolution acts at a slow pace. Today's tree species have a plasticity which should allow them to cope with temperature changes. But spruce can suffer from drought in some areas. Broadleaved trees can be more competitive in establishing themselves, and may move further north. Some alien plant species may spread and cause undesired effects in ecosystems and for forestry. Pathogens and insects can change their distribution and population size and possibly cause problems. Sustainable forest management must thus prepare for and deal with a number of gradual and abrupt changes related to climate change.

New forestry practices must take into account scenarios for changes in climate. Planning should consider the need for transition among organisms and in ecosystems. Planning of protected areas must be dynamic to a greater extent, and predict the ability of various species to move in the landscape, both in altitude and latitude.

4.3 Practices, policies and new ideas

Forestry practices

Nordic boreal forestry is probably the most efficient in the world. Its practices are, however, fairly uniform throughout the landscape, from north to south and from east to west. The most common procedure is planting with spruce or pine, a couple of thinnings and then clear-cutting after 70–100 years. More or less all Swedish forests will soon have undergone this rotation of industrialized forestry. It has created significant economic wealth, but also reduced ecological values, biodiversity and ecosystem services. It has thus exacerbated ecological, and perhaps also economic, vulnerability. Historically, Nordic forests are gradually being transformed from pristine ecosystems — with the pre-industrial humankind as one component — to more or less uniform stands supplying industry with wood raw material.

Today's forest-management models focus mainly on production of soft wood pulp. To some extent, nature-conservation aspects are included in current practices. About 60% of Swedish forests are included in the international FSC and PEFC labelling systems. Moreover, society has a responsibility for nature conservation, which is carried out mainly by establishing nature reserves. There is an urgent need to restore ecological natural values in many of today's young and middle-aged forests. This is a field where both practical experience and scientifically based knowledge are largely lacking.

The Riksdag (the Swedish Parliament) has adopted 16 environmental objectives. One, 'Sustainable Forests', is defined as follows: 'The value of forests and forest land for biological production must be protected, at the same time as biological diversity and cultural heritage and recreational assets are safeguarded.' The current official assessment indicates that 'the target will be very difficult to achieve to a sufficient degree/on a sufficient scale within the defined time-

frame' (20 years). Forest management also has a bearing on several other environmental objectives, especially 'Reduced Climate Impact', 'Natural Acidification Only', 'Zero Eutrophication', 'Thriving Wetlands' and 'A Rich Diversity of Plant and Animal Life'. But it is not enough to safeguard the ecological values of the forest landscape. To attain the national environmental objectives, modern forestry must be developed further.

There is a trend of forestry practices becoming better adapted to local conditions. Scientific approaches in this area could, however, be extended. Different landowners need a greater range of models (practical advice) for their forest management than are available today, depending on the conditions for and purposes of forestry. Such models should include a wide range of aspects — ecological, social, economic and so forth. Practices that respond to and emulate natural disturbances, as well as soil and forest water aspects, should be considered. New models must take account of the fact that the world is changing. Planning for climate change is essential (see below), as is openness to changes in demand for and use of forest resources in the future.

Disturbance, resilience and ecosystem services

The Nordic forestry model is based on the 'ecosystem approach', which implies maintenance of industrialized, sustained-yield forestry in a natural forest ecosystem, rather than wood production in separate plantations and biodiversity safeguarded in protected areas. The capacity of an ecosystem or a social system to withstand a wide range of changes, shocks or disruptions and still retain its fundamental function, structure and feedbacks is known as its 'resilience'. Resilient systems are characterized by a high degree of diversity, especially in terms of critical functions. These systems are less vulnerable to disturbances, such as extreme climate events (storm, drought, etc) and large-scale outbreaks of insects or pathogens. This call is aimed at supporting forest management systems that can maintain or increase ecosystem resilience so that a range of ecosystem services, including commercial wood production, can be sustained in the long term. A first step on the way forward is to merge two current paradigms — 'sustained yield forestry' and 'species-oriented nature conservation' — with the 'ecosystem services paradigm' and place them in a broader human perspective.

To be resilient, forest ecosystems need to maintain as much complexity as possible so that they can reorganize themselves, following disturbance, as 'creatively' as possible. In that sense, forests behave like complex systems with chaotic behaviour and non-linear relationships that make it difficult to predict their dynamics following disturbance. The notion of complexity in forest management should therefore be explored in the context of climate change, resilience and changing social values.

Different parts of the landscape provide varying types of ecosystem services. Productive forest lands close to forest industries, for example, may be especially valuable for forest production, as long as some sites are protected to support naturally occurring forest types. Within productive forest lands there may be ecological, cultural, and economic value in productive forests with both high-value, slow-growing hardwoods and more rapidly growing production forests, since it is uncertain which may be more profitable 50 years from now. Unproductive peat bogs and marshes, however, may have greater economic potential through carbon sequestration in peat to obtain carbon credits, while simultaneously supporting a diverse flora and berries that attract local residents and tourists.

High-elevation areas may have greater economic and cultural potential as habitats for herbivores and other wildlife, catchment areas for urban water supplies, and areas for fishing and recreation than as forest land, even if climate warming makes them more favourable to forest growth.

Similarly, wetlands that are frequently flooded may have greater value in terms of flood control, waterfowl habitat and biodiversity protection than if they are drained to support forestry. Higher energy prices boost the costs of transporting wood products from forests that are remote from industrial areas and population centres. It may be useful to manage these forests for different purposes from forests associated with low transport costs. Forests close to population centres, on the other hand, are of great value for recreation, which can be combined with preservation of biodiversity, but to a lesser extent with wood production. Concepts that include zoning at landscape level, including the triad of conservation, intensive (plantations) and extensive forest management, may be further developed.

Existing and new products and technologies

Many products from wood raw material are efficient in terms of carbon dioxide (CO_2). They can be used to replace less carbon-efficient products; many can be recycled; and ultimately many of them can be used for energy production. Examples are wood-based packaging and construction materials.

Improved tree growth and lower cost of wood at the factory gate are needed by the forest industry to meet rising demand for wood raw material. This can be obtained by a number of advanced forestry practices, including increased fertilization, improved plant breeding, use of alien tree species, plant protection, elaborate cultivation methods and new forestry techniques. Expected climate change will contribute to increased growth in most boreal forests, whereas forest production in other regions of the world may suffer from a diminishing water supply. The effects of climate change combined with ways of boosting growth may, it is suggested, make a significant increase in growth attainable for, at least, some parts of Swedish forests. Increased growth is also mitigating the increase of CO_2 in the atmosphere.

Mistra wishes to point out that increased growth, albeit the idea that prevails at present, is only one of several feasible ways of boosting the future competitiveness of Nordic forest industry. With its long-term perspective, this call should also consider options other than growth alone to maintain competitiveness. Improved wood and wood-fibre properties and multi-purpose forest use are examples of other options.

Nevertheless, Mistra expects a research programme to include research on how to boost tree growth in a sustainable way. This area has been a focus of research for a long time, and Mistra expects the forest industry to cover most such research in a programme deriving from this call. If new biotechnology, plant breeding and genetic modification of plants are included as methods of boosting growth, then social and ecological conditions and the risks of such techniques should be included.

To enhance the options in an unpredictable future, Mistra is willing — together with the forest industry and other stakeholders — to support research on additional and sustainable ways of developing business opportunities based on the resources of the forest landscape.

Examples of traditional and new business opportunity based on wood

- The Nordic paper industry may be compelled to be even more of a forerunner in developing new products and applications to make it more profitable. Countries with better tree growth can outcompete bulk production. This factor must be considered in future forestry development.
- New innovative, wood-based 'green' materials and chemicals may be profitable new forest products. Products of these kinds have the potential to contribute significant added value to the forest-based sector by

replacing fossil-based or energy-consuming products. It should be a competitive advantage to be early in inventing and adopting such new technologies and market niches.

- The market for bioenergy from both crops and wood is expanding rapidly. Hybrid-vehicle technology combined with biofuels may account for a significant portion of the future market, in the short to medium term. The question of Nordic forestry's long-term prospects for producing bioenergy, compared with other products, is a strategic one. The competitiveness (in economic, social and environmental terms) of wood-derived bioenergy in relation to tropical products like sugarcane ethanol or biodiesel from oil-rich crops is another key issue.
- Using wood for construction is a traditional practice that has good prospects of increasing in the future. Compared with, for example, concrete, steel and aluminium, the performance of wood is superior in terms of carbon emissions. Wood used in construction also stores carbon for many decades, or even centuries. The environmental advantages of using wood for construction to its full potential remain to be discovered.

First-mover advantage

- The environmental footprint of products is a growing concern among consumers. Increasingly, company directors, managers and employees, but also share-holders, are reluctant to be associated with unsustainable products or processes. There is also a general trend in society for product prices to include environmental costs. There are thus several convergent factors making corporate ecological and social responsibility good for business as well. In this respect, Nordic forestry has a first-mover advantage that is far from fully exploited. This call may be a good opportunity to develop this advantage further.

Unevenly distributed values

One critical question is how to plan the forest landscape on various geographical scales, given its heterogeneous distribution of economic, social and ecological values. How, for example, should authorities and landowners protect biodiversity, given the uneven distribution of 'hotspots' (biogeographic areas that are significant reservoirs of biodiversity and threatened with destruction)? For a single large landowner, this may be a problem that requires inputs from ecological research on population dynamics. How the uneven distribution of values among different landowners should be tackled is an issue with political or ideological implications — and one on which the social sciences may provide appropriate guidance.

5. RELATION TO OTHER RESEARCH INITIATIVES

This call is designed to match significant parts of the National Research Agenda (NRA), which is currently being developed, to the Strategic Research Agenda (SRA) of the Forest-based sector Technology Platform (FTP), an initiative of the European forest industries and forest owners. To date, the FTP has been generously provided for in the EU's Seventh Framework Programme on Research. Significant amounts of additional funding from EU for the research based on this call are therefore to be expected.

This call focuses on the forest landscape and forestry. It is thus designed to complement VINNOVA's 'Sector Research Programme for the Forest and Wood Industries' (*Branschforskning-program för skogs- och träindustri*), which focuses on the wood raw material when it reaches the factory gate and beyond. VINNOVA's programme is also a matching part of the NRA, including product development, lifecycles, processes, etc.

One current Mistra programme and one programme that is just starting must be considered in the planning of a programme based on this call. The former is the longstanding Heureka Research Programme, which develops computer-based tools for forest analysis and planning. Heureka, which is also funded through the Swedish Forest Industries Federation, the Swedish University of Agricultural Sciences (SLU) and the Kempe Foundation, integrates knowledge from many fields of study to analyse the multiple uses and environmental impacts of forest land.

The second programme is the Swedish Research Programme on Climate, Impacts and Adaptation (SWECIA), which has just been approved by Mistra and is planned to start its first phase in 2008. SWECIA will create a model-based capacity of assessment combining climate, economic and impact modelling in a consistent framework for studies that combine global interactions with regional-to-local detail in targeted areas and sectors. Adaptation to climate change in the forest landscape is one of the priority areas of implementation in the SWECIA programme.

The new Mistra-initiated 'Stockholm Resilience Centre' (concerning resilience in social and ecological systems) is another undertaking relevant to the research in this call. Possible collaboration should therefore be described. Relevant knowledge and experience from completed Mistra programmes — such as SUFOR, ASTA and LUSTRA — and projects or programmes funded by other sources (such as Formas, the Swedish Energy Agency and VINNOVA) should also be considered.

6. BACKGROUND INFORMATION ON MISTRA CALLS

From 2007, Mistra welcomes proposals for research programmes in response to published calls only. Mistra's calls may address specific topics; alternatively, provided they are in line with Mistra's overarching objectives, they may be open. Most of Mistra's new research endeavours derive from specific calls, i.e. those in which Mistra has

- defined the topics, such as particular environmental problems
- specified the means of implementation and particular user categories.

The other route to new Mistra programmes is through external initiatives in response to open calls, i.e. a more bottom-up process. Open calls complement specific calls. The present call is specific.

Mistra's objective is to help solve environmental problems by investing in relevant academic research. Mistra is actively involved in the endeavours it supports at every stage, from planning to implementation. The Mistra concept is a continuous process of learning how to build bridges between researchers and practitioners, thereby contributing to sustainable development.

More information on Mistra's strategy, application procedures, design and management of research programmes may be found in Mistra's guide, "How to go about it — Applying for funds for research in support of sustainable development" *(Hur ska ni göra – Söka finansiering till forskning för en hållbar utveckling)*. This call provides specific further details about this specific and on the application criteria and procedure outlined in the guide, which may be downloaded in English or Swedish from www.mistra.org.

7. PROPOSAL CRITERIA AND PROGRAMME DESIGN

7.1 Mistra's investment and cofunding

Mistra endorses flexibility in terms of size and duration, with programme design appropriate for the task concerned. This call is for pre-proposals for a research programmes designed to run for one or more phases, which normally last four years each. Mistra's part of the annual budget could

be in the range of SEK 5–15 million. In this case, cofunding from other sources is a prerequisite for Mistra funds, not least to ensure commitment from important users. Mistra's investment will be adjusted to a level that is judged to be appropriate for the tasks formulated in a successful proposal. It will also be adjusted to be in the same order of magnitude as the cofunding from the forest industry and forest landowners. Rather than tactical reallocation of already existing research funds, Mistra expect this cofunding for the most part to be new. Mistra appreciates a flexible ability to add new funds from different organizations.

Mistra expects cofunding from industry and forest landowners to focus primarily on the economic aspects of sustainable development, such as forest growth, forestry efficiency and preparations for new products and markets. Mistra's primary role should be, in accordance with its mission, to complement such research with the social and ecological aspects linked to the forest landscape. But new, sustainable business development also falls within Mistra's mission. A joint, comprehensive initiative of this kind should have the potential to deliver efficient and sustainable management practices for the use of the forest landscape. Mistra also welcomes cofunding or subsequent collaboration with other funding bodies.

7.2 Potential for solving important environmental problems

Value to intended users

There must be a clear conception of how the research will make a significant practical contribution to solving environmental problems. A dialogue should be established with practitioners to take their views into consideration in the research. Mistra welcomes broad outlines of the organizational forms for this dialogue in the pre-proposals.

Examples of user categories are

- policymakers, including e.g. national and international agencies and multilateral interest groups
- businesses using wood and other forest resources, including large, medium-sized and small forest landowners
- NGOs

World-class scientific quality

The proposed research must be internationally competitive. Mistra attaches importance to collaboration and synergies with international research programmes. Research groups that apply should have well-established contacts and/or be engaged in collaboration with relevant international research groups. Researchers from countries other than Sweden are welcome as members of applicant groups. Mistra encourages the recruitment of participants characterized by excellence both in Sweden and from abroad. Initiatives for Mistra programmes from researchers outside Sweden are welcome provided they have strong working links with groups in Sweden. The research should be carried out by individuals with the relevant academic qualifications, preferably at least at postdoctoral level.

Capacity to make Sweden more competitive

Being 'competitive', here, refers both to Swedish enterprise and to competitiveness in the broader sense of Sweden being a good country to live in, given a lead in the area of sustainable

development. Effective international environmental regulations should, moreover, generally boost Sweden's competitiveness.

Creation of strong research environments

Mistra's programme investments are expected to promote the development of strong research environments. A Mistra programme can build on an existing strong research environment or foster the emergence of a new one. The potential of the research environment and the scientific merits of the proposal in question are assessed in a scientific peer review carried out by well-qualified foreign researchers.

Mistra welcomes research proposals initiated by higher education institutions (HEIs) and institutes, as well from practitioners (business sector, NGOs, etc).

Sound management and good organization

Every programme must select a management team and define an organizational structure suited to its needs. A Mistra programme is often a large, complex endeavour in which many individuals need to work together towards a common goal. To achieve results, such a programme must be effectively managed and organized. Another key success factor is excellent administrative, academic and user-oriented support from the programme host. In most cases the host is a Swedish university or other HEI, but companies and institutes may also be considered. To ensure adequate support on the part of the host organization, the pre-proposal must be submitted by the Vice-Chancellor (Rector) of the HEI, director of the institute, chief executive of the company or equivalent. This person must also submit a written account of how the endeavour described in the pre-proposal relates to the existing strategic planning of the HEI (or equivalent). The programme area must be one that is given priority by the host organization.

Before embarking on a programme, the host organization must appoint a programme board in consultation with Mistra and cofunding companies or organizations. One of this board's responsibilities is, in cooperation with the host organization, to appoint a programme manager or director.

To optimize conditions for interaction among different academic disciplines, Mistra encourages geographical concentration of the component projects of the programmes. In this call, geographical concentration, in particular, should be considered for an anticipated core synthesis and implementation function (see above). However, networking between existing centres of scientific excellence at geographically separated but strong research environments is also encouraged, especially for possible subprojects. A description of, and arguments for, the chosen strategy of programme infrastructure must be provided in the application.

8. TIMETABLE

Programmes ensuing from this call are expected to start on 1 January 2009. The planning schedule up till programme launch is as follows:

- June 2007 — call announcement
- 11 October 2007 — deadline for pre-proposal submission
- November 2007 — invitations to submit full programme proposals
- 1 April 2008 — deadline for submission of full programme proposals
- April/May 2008 — evaluation of scientific value and utility

- June 2008 — funding decisions by Mistra's board
- Autumn 2008 — final arrangements and signing of contracts between Mistra, programmes and programme hosts
- 1 January 2009 — commencement of research programmes.

9. APPLICATION PROCEDURE

There are two stages in applying for Mistra grants:

- submission of a brief (max. 15-page) pre-proposal, open to all comers
- submission of a full programme proposal, by invitation from Mistra only.

The 15-page pre-proposal should contain

- a description of the research in question and how the research is expected to make a concrete and significant contribution to a sustainable development of the forest landscape
- an overview of the possible organization of the program
- an account of the stakeholders and/or practitioners with whom the research group is conducting and/or plans to conduct a dialogue
- an indication on amount of, and degree of commitment for, cofunding from other sources
- a brief description of the methods to be used
- details of the planned research group's composition and international collaboration
- a general timetable and budget for the proposed programme
- a statement from the University Vice-Chancellor (Rector), institute director, company chief executive or equivalent on how the proposed research fits in with the strategic planning and priorities at the respective university or HEI, institute, company or equivalent.

The pre-proposal must

- describe how the conditions outlined in this call are to be met
- be written in English
- include a request, and an approximate budget, for planning grants if so desired
- not exceed 15 pages (font size ≥ 12 points) in length
- enclose one-page CVs (over and above the aforesaid max. 15 pages) for the key persons to be involved in the programme
- include a one-page summary of the pre-proposal
- not include letters of intent — the cooperation situation must be described in the application text
- be submitted by the Vice-Chancellor of the host university or HEI, director of the host institute, chief executive of the host company or equivalent
- be submitted by e-mail to forestcall@mistra.org not later than 4.00 pm on 11 October 2007. If possible please bundle your proposal in one document.

Only pre-proposals that comply with the above rules will be considered.

In planning and preparing their pre-proposals, applicants are strongly advised to

- study the guide *How to go about it — Applying for funds for research in support of sustainable development*, available at www.mistra.org
- consult Mistra staff (see below) to ensure that the pre-proposal is within Mistra's area of interest and obtain general information about establishing and running a Mistra programme.

10. SELECTION AND EVALUATION

Decisions on which pre-proposals will be invited to submit full programme proposals will be taken by Mistra after consultation with a review panel comprising international experts as well as national users. Organizational aspects as well as scientific and practical value will be considered.

Prior to the Mistra board decision in June 2008, full programme proposals invited will undergo two evaluations, focusing on scientific and practical value respectively, to be carried out during April and May 2008. Organizational aspects will be assessed in both evaluations.

Based on the evaluations, Mistra can cancel the entire initiative if there are no proposals showing enough scientific creativity and excellence, or with only poor value to users.

Mistra expects cofunders to become involved only in proposals that they fully approve. However, to ensure confidence in the procedure, Mistra will also appoint review panels after consulting important users and cofunders.

Evaluation of the pre-proposals will focus the aims and requirements stated in this call, including:

- potential for contributing to sustainable development of the forest landscape, in line with descriptions in this call
- value to intended users
- world-class scientific quality
- capacity to make Sweden more competitive
- creation of strong research environments
- sound management and good organization.

Mistra intends to fund only one programme based on this call. However, Mistra will invite submission of up to four full programme proposals. Besides approval or rejection, based on recommendations from the evaluations, Mistra can suggest changes in proposals and invite modification or resubmission.

11. CONTACT

For questions and consultation, please contact Programmes Director **Olof Olsson**, phone +46 (0)8 7911022, email olof.olsson@mistra.org.

Staffing of Mistra's office will be sporadic between 2 July and 3 August 2007.

This call is available online at www.mistra.org.