



GenomeCanada

Request for Applications
2020 Large-Scale Applied Research Project Competition: Genomic Solutions for Natural Resources and the Environment

1. Overview

Canada has a vast wealth of natural resources, which contributes significantly to both national and regional economic well-being. Resource industries play a critical role in delivering jobs, growth and prosperity for Canadians: in 2018, they directly and indirectly accounted for 17% of nominal GDP and around 1.7 million jobs. In addition, natural resources account for more than half of Canada's merchandise exports and were valued at \$264 billion¹. However, these sectors are facing increasing pressure as a result of climate change and other threats such as the rapid increase in the world's population impacting land use and natural habitat.

The natural resource and environment sectors have a history of using research to assess challenges and develop various solutions. Knowledge and innovation emerging from genomics² have the potential to help address the challenges in these sectors and thereby drive sustainability, growth, productivity, commercialization and global competitiveness. Previous investments from Genome Canada in these sectors have led to development of genomic tools, resources and policies for biomonitoring and ecotoxicological risk assessment, bioremediation, and increased efficiency of hydrocarbon extraction. In addition, tools have been developed to increase forest sustainability for present and future climates and changing economic markets, e.g., tools to identify trees with the desired qualities for reforestation programs including identification of populations at higher risk from climate change, as well as tools to screen for invasive species.

Genome Canada, together with Natural Resources Canada (NRCAN), is seeking proposals for large-scale research projects which focus on the application of genomics in Canada's natural resources and environment sectors and address challenges and opportunities of importance to Canada. This funding opportunity builds on the complementary mandates of Genome Canada and NRCAN and provides an opportunity to bring together and maximize the effectiveness of the research communities, infrastructure, and resources supported by both organizations. This funding opportunity makes it possible to collaboratively carry out joint projects with NRCAN researchers, where Genome Canada

¹ <https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/emmc/pdf/2019/2019-KFF-EN.pdf>

² The term genomics is defined here as the comprehensive study, using high throughput technologies, of the genetic information of a cell or organism and its functions. The definition also includes related disciplines such as epigenomics, metabolomics, metagenomics, proteomics, transcriptomics, bioinformatics and synthetic biology as long as the link to genetic information is clear.

funds will support the Genome Canada eligible researchers and NRCan funds will support the NRCan researchers.

Large-Scale Applied Research Projects require a team-based approach that is collaborative, integrative and applied. Researchers with different disciplinary expertise, using a variety of research strategies and methodologies, contribute to a broader understanding of the research problem to be addressed. Research questions should be informed by intended users of the research who can help identify opportunities, barriers and define knowledge gaps that need to be addressed.

2. Objectives

The 2020 Large-Scale Applied Research Project (LSARP) Competition aims to support applied research projects that use genomic approaches to address challenges and opportunities in Canada's natural resources and environment sectors, including interactions between natural resources and the environment, thereby contributing to the Canadian bioeconomy, a healthy environment and the well-being of Canadians.

The scope of this funding opportunity will include areas such as genomics research related to energy, mining, forestry, water stewardship, healthy oceans, wildlife management/conservation and bioproducts³ that help conserve natural resources, protect the environment and support sustainable resource management. It also includes the use of genomics to understand the adaptive genetic potential of species, populations and ecosystems to climate and other environmental changes and stressors, and identify those key elements that impact ecosystem structure, function and diversity.

Applicants must demonstrate how their proposal holds a high potential for attaining concrete deliverables by the end of the funding period. Proposals that make a strong case that those deliverables will be subsequently translated into significant social and/or economic benefits within as short a time frame as possible after the end of the project are particularly encouraged, taking into consideration what is reasonable for the different research areas in these sectors.

To ensure that the objectives of the RFA are met, all applications must address the evaluation criteria established for the competition, i.e., quality of the research proposal, social and economic benefits for Canada, and management and financial competency (see Appendix 1). Only those proposals demonstrating the highest degree of overall excellence will be funded.

3. Funding Available and Term

- There is approximately \$25 million available for this competition from Genome Canada and approximately \$1.5 million from NRCan.
- The maximum contribution to an approved project will be \$3 million from Genome Canada.
- There must be a minimum contribution of \$1 million from Genome Canada in each approved project.
- NRCan will only invest in projects it determines to be relevant (see Appendix 2).

³ The bioproduct area includes products (e.g., biochemicals, biomaterials and bioenergy) made from biological or renewable material and biomass such as forestry byproducts and municipal waste.

- Although collaborations with NRCan researchers are encouraged, where feasible, projects are not required to include a component that would be funded by NRCan.
- A project's eligible costs must be co-funded from eligible sources such that the co-funding is at least equal to the Genome Canada contribution. The co-funding must be from eligible sources other than the NRCan funds designated as part of the funding opportunity. It is the responsibility of the lead Genome Centre(s), working with the applicants, to obtain the necessary co-funding.
- Successful projects will be awarded funding for a term of up to four years.

4. Research into the implications of genomics in society (GE³LS research⁴)

Because genomics and its applications in the natural resource and environment sectors have the potential to have significant social and economic impact, all projects must undertake research into the application and implications of genomics in society (GE³LS research). GE³LS research can either be the major focus of the project or an integrated component that is shaped by, and helps shape, the overall project.

The GE³LS research supported in this competition should investigate aspects of responsible innovation in the natural resource and environment sectors, including for example: key factors that may facilitate or hinder the effective translation of research and the uptake of genomic-based applications. It is expected that the outputs from the GE³LS research should have the potential to inform and help implement changes in practices or policies related to use of genomics research and innovation, or enhance the understanding of the implications of genomics in society more broadly.

Integrated GE³LS research must address salient factors that will impact the advancement and application of the project's genomics research. The integrated GE³LS research questions must be aligned with, and complementary to, the overall project goals.

GE³LS research may be conducted by researchers from universities, government, industry, not-for-profit or other organizations, who generally are trained in disciplines other than the life sciences, including social scientists or scholars in the humanities or law.

5. Eligibility

Each proposal will be reviewed for eligibility at each stage of the application process. The following criteria will be used:

- Does the proposal respond to the objectives of the Genome Canada competition?

⁴The acronym GE³LS stands for "Genomics and its Ethical, Environmental, Economic, Legal and Social aspects". However, it should be understood broadly as research into the implications of genomics in society from the perspective of the social sciences and humanities. Therefore, it is not strictly limited to disciplines that make-up the acronym but rather encompasses all those that rely on quantitative and qualitative methodologies to investigate the implications of genomics in society, and inform applications, practices and policies. In the context of this RFA, it can also include approaches from a wide range of disciplines including but not limited to: development studies, environmental sciences, geography, innovation studies, political sciences and population studies.

- Does the proposal include genomics approaches as essential components in terms of importance to the overall outcomes of the project?
- Does the proposal include GE³LS research either as the major focus or as an integrated component of the project?
- Is the proposal of a scale and scope such that it is able to address challenges requiring a genomics approach, be internationally competitive and have the potential to have major impact?

To be eligible for partner funding, applicants must satisfy the requirements for the competition as outlined above as well as any additional requirements put forth by the partner as described in Appendix 2.

This competition provides an opportunity for research teams to propose large-scale projects that would be part of even larger national and international research initiatives, as long as other eligibility criteria are met.

Projects funded through this competition must focus on using genomic approaches to address challenges and opportunities of importance to Canada's natural resources and environment sectors, including interactions between natural resources and the environment. Topics of applied research that could be addressed include, but are not limited to, the following:

- genomic solutions to enable increased recovery and greener extraction and processing in the mining and energy sectors (e.g., a better understanding of microbial activities related to exploration, recovery, reclamation, bioremediation, recycling and waste treatment)
- genomic solutions to increase productivity, sustainability and/or resilience to climatic extremes in Canadian forests, including urban forests
- genomic solutions for rapid detection, tracking and management of invasive species and diseases that threaten the health and ecological integrity of terrestrial and aquatic ecosystems
- genomic solutions to improve water (marine and fresh) stewardship to ensure sustainable management and use of water, as well as protecting the quality of water so that it is clean, safe and secure for all Canadians and supports healthy ecosystems (defined as a biological community of interacting organisms and their physical environment)
- genomic approaches to a better understanding of the effect of climate change on the ecology, presence, distribution and spread of vectors and vector-borne diseases in natural ecosystems and how this can negatively impact biodiversity and wildlife populations
- development and validation of tools for ecotoxicogenomic assessment of environmental exposure to toxic substances that can be used in impact/risk assessment of an ecosystem's response to contaminants
- genomic approaches to a better description and understanding of biological diversity and ecological integrity for applications such as enhanced biomonitoring to track native species in order to measure the impact of climate change, track and monitor genetic diversity within and

between populations, provide for early warning systems, and/or track the impact of bioremediation in terrestrial and aquatic environments

- enhancing conservation and management of vulnerable terrestrial and aquatic ecosystems by using genomics to understand the adaptive potential of key species, populations and ecosystems to climate and other environmental changes.
- genomic and engineering biology approaches to valorize waste and side streams into valuable biomass-based fuels, biochemicals, bioplastics and other biomaterials
- genomic approaches to accelerating remediation of contaminated environments by, e.g., identifying microbial communities that can break down toxic compounds
- investigating the effects of the application of genomics on international trade and market access to exports of Canadian natural resource products
- exploring the role of genomic technologies related to natural resource issues of importance to indigenous populations through a co-production of knowledge approach that brings together different knowledge systems while building equitable and collaborative partnerships from different ways of knowing
- exploring the effects of national policies and/or regulations on the uptake of genomics-based applications by users (e.g., indigenous communities, conservation managers, non-governmental organizations, government and industrial partners) and the impact on sector competitiveness and productivity

NOTE: Studies focussing on human health as impacted by the environment or projects focussed on producing food or food supplements for human or animal consumption are not eligible for support in this competition. Studies focussed on genomic solutions for commercial fisheries and aquaculture, as well as bioproducts based solely on agriculturally-sourced feedstock, were eligible in the previous competition and are therefore not eligible here.

6. User Engagement

All projects must clearly demonstrate engagement with users in the development and execution of the research plan in order to help ensure receptor uptake and practical applicability of the research. This engagement should inform the genomics research, the GE³LS research, and to the extent possible the integration of the GE³LS research into the overall project.

“Users” in the context of this RFA can be defined as those who are able to use the information generated through research to make informed decisions on relevant issues, policies, programs and product development. Examples of user organizations could include industry and industry associations, government departments and regulatory agencies.

Users must be clearly integrated into the project team in the form of a project team member, collaborator and/or member of the management team. Users are encouraged to actively collaborate in the priority setting and conduct of research as well as in summarizing, distributing, sharing, and

applying its resulting knowledge. Co-funding would clearly demonstrate user interest in the project's potential deliverables, although it is not a requirement for a user organization to contribute to the co-funding required.

7. Benefits for Canada

All applications must describe, with supporting evidence, the deliverable(s) that will be realized **by the end of the project** that have the potential for subsequent translation into significant benefits for Canada.

Proposals that make a strong case that those deliverables can and will be subsequently translated into significant social and/or economic benefits within as short a time frame as possible after the end of the project are particularly encouraged, taking into consideration what is reasonable for the different research areas in these sectors.

Applications must include a plan which explains the next steps of how the deliverables from the research will be transferred, disseminated, used, and/or applied to realize the benefits. Once funded, the project teams will be required to further elaborate on this plan as time goes on so as to provide a more substantive business case that will describe the path forward to ensure that the proposed deliverables and benefits are realized in the stated time frame and within the approved budget. The project's Research Oversight Committee (see below) will assess this plan on an on-going basis.

See **Appendix 1** for more details on all review criteria.

8. Equity, Diversity and Inclusion

A diverse and inclusive research community strengthens research outputs, innovation and creativity. As such, Genome Canada has committed to making equity, diversity and inclusion (EDI) a priority through the integration of EDI principles into all funding opportunities. It is expected that project teams will include participation by under-represented groups as part of the research team and/or users of the research, as appropriate. Underrepresented groups include, but are not limited to women, Indigenous peoples, members of visible minorities, and persons with disabilities.

Incorporation of new researchers into the team is encouraged. New researchers are defined as early stage investigators (i.e., within five years of their first appointment allowing them to be an eligible individual as per Genome Canada Guidelines). The five-year window should take into account instances where a researcher has had an acceptable delay in research or a period of inactivity (e.g., due to illness, parental leave, etc.).

Furthermore, applications involving research projects that incorporate Indigenous knowledge systems (including ontologies, epistemologies and methodologies) and are carried out by and with Indigenous peoples, including First Nations, Métis and Inuit peoples, are welcome. Projects involving Indigenous research should be conducted with sensitivity, and only after consideration about who conducts the research and why and how it is conducted. Research should be conducted in line with the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans, and, in particular, Chapter 9: Research Involving the First Nations, Inuit and Métis peoples of Canada.

http://www.pre.ethics.gc.ca/eng/tcps2-eptc2_2018_chapter9-chapitre9.html

9. Competition Timeline

Requests for support of projects must be submitted to Genome Canada through a regional Genome Centre. Please contact your Genome Centre for further information on their process and internal deadline dates.

January 2020	Launch of Competition
Please check with your Genome Centre	Deadline for submitting Registration to a Genome Centre
Please check with your Genome Centre	Deadline for submitting Pre-Application to a Genome Centre
July 2020	Applicants notified of results of Pre-Application after peer review organized by Genome Canada
Please check with your Genome Centre	Deadline for submitting full application to a Genome Centre
Mid-November 2020	Genome Canada's Review Committee meets (including meetings with applicants)
Mid-December 2020	Decisions by Genome Canada and Partners (if applicable)
Late December 2020	Notification of Decision

10. Application Process

Applicants are required to apply for funding through their regional Genome Centre. The application process is comprised of three steps: Registration, Pre-Application and Full Application.

10.1. Registration

A brief Registration form will be used to provide early guidance on elements such as who is applying, what they are planning to do, research areas including integrated GE3LS, expected deliverables, approximate budgets and suggested reviewers. This allows for screening of eligibility by the Genome Centres and facilitates the early selection of reviewers for the peer review process. Information from eligible registrations (i.e., name of project leader(s), lead institution, title of project, research areas and keywords) will be posted on the Genome Canada website to facilitate the identification of areas of potential synergy between applications across the country, so that applicants can consider engaging with other researchers on a common project. This will also make possible the exchange of required

information between project teams and genomics technology service providers, such as Genome Canada supported Genomics Technology Platforms.

10.2. Pre-Application

For the **Pre-Application**, applicants will be asked to submit a short description of the following:

- The proposed genomics research, GE³LS research, and an integration plan;
- How the team will engage users in the project;
- Expected deliverables of the research; and,
- The potential social and/or economic benefits of the research

Pre-Applications will be reviewed in a two-stage process. The first stage involves an initial review that will be done “at-home” by a College of Reviewers who will evaluate the Pre-Applications, focusing on the quality of the research plan and the potential for benefits for Canada. College reviews will provide a rating for the quality of the research proposal and potential for benefits, and the mean score for each of these categories will be calculated separately. A ranking list of the Pre-Applications, based upon the mean of the scores for both criteria (quality of the research proposal and benefits) will be prepared. The Pre-Applications with the lowest scores will not be considered further.

The second stage will involve review by a Pre-Application Review Committee (PARC) with broad expertise in research including GE³LS, technology development, research management and the translation of research results in areas relevant to the competition. This committee will consider the College reviews and make a final recommendation to Genome Canada on which Pre-Applications should be invited to submit a Full Application.

The proposals will again be checked for eligibility to the program. Only the most competitive Pre-Applications will be invited to submit full applications. It is expected that approximately 20-24 Pre-applications will proceed to the full application stage. Information from approved Pre-applications (i.e., name of project leader, lead institution, title of project, research areas and keywords) will be posted on the Genome Canada Website to further facilitate the exchange of information between project teams and genomics technology service providers such as the Genome Canada supported Genomics Technology Platforms.

10.3. Full Application

Those applicants successful at the Pre-Application stage will be asked to submit a full application. Full applications must address the evaluation criteria established for the competition, i.e., quality of the research project, social and/or economic benefits, management and financial competency. A final check for eligibility will be carried out. A multidisciplinary committee of experts, with expertise in assessing all of the review criteria, will be established to review applications. The review committee will meet with and interview representatives from each project through a face-to-face meeting. Only those proposals demonstrating the highest degree of overall excellence will be funded.

The evaluation processes may be adjusted where warranted by the complexity of proposals received or other relevant factors. Any changes will be communicated through [Genome Canada's website](#) and through the Genome Centres.

11. Project Management and Oversight

All funded projects must adhere to Genome Canada's [Guidelines for Funding](#).

11.1. Project Managers

All approved projects must have a dedicated project manager. Project managers coordinate administrative and reporting requirements and support the project's research enterprise.

11.2. Research Oversight Committees

All Genome Canada-funded projects will have a Research Oversight Committee (ROC) constituted by, and reporting to, the Genome Centre(s). The ROC reports to the Genome Centre on the progress being made by the project and makes recommendations to the funders regarding continued funding, as well as providing advice and guidance to the research team to help ensure that the project achieves its stated objectives and milestones. The membership of the ROC must be completely independent from the project, with no real or perceived conflicts of interest and should be composed of experts who will work with the Genome Centre and the funders to maximize the successful outcomes of the project. A portion of the funds awarded to each project will be designated to cover costs associated with the project's ROC. Contact your Regional Genome Centre for additional information.

12. Co-Funding

A project's eligible costs must be co-funded from eligible sources such that the co-funding is at least equal to the Genome Canada contribution. The Genome Centres, working with the applicants, are responsible for securing co-funding. Co-funding for this competition must be for research activities that are an integral part of the Genome Canada approved project and must be for eligible costs specifically requested in the Genome Canada budget form in order to be considered as an eligible co-funding source. See the [Guidelines for Funding](#) for more details.

13. Contacts

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Appendix 1. Evaluation Criteria

Proposals submitted to Genome Canada are evaluated via a rigorous independent peer review process to assess their research merit and potential for social and/or economic benefits for Canada, as well as to ensure that sound management and financial practices are implemented.

Eligibility Criteria

Each proposal will be reviewed for eligibility at each stage of the application process. The following criteria will be used:

- Does the proposal respond to the objectives of the Genome Canada competition?
- Does the proposal include genomics approaches as essential components in terms of importance to the overall outcomes of the project?
- Is the proposal of a scale and scope such that it is able to address challenges requiring a genomics approach, be internationally competitive and have the potential to have major impact?

If considered eligible, the proposal will be reviewed using the criteria described below:

Review Criteria

The review criteria fall into three categories:

- 1) Research Proposal;
- 2) Social and/or Economic Benefits; and,
- 3) Management and Finance

Note that the descriptive phrases which follow the criteria below are not all-inclusive.

1. Research Proposal

Including research into the implications of genomics in society (GE³LS research)

- Research Context and Originality
 - To what extent does the proposed research lead, extend and/or complement national and international work in the area?
 - To what extent does the proposed research reflect creative and original thinking?
 - To what extent is the research relevant to the users identified?
- Research Plans
 - How appropriate are the methods and approaches in terms of the research objectives?
 - How feasible is the research given the projected resources and timelines?
 - How appropriate is the plan for handling and sharing of data and resources within the project and with the wider community? Does the plan comply with [Genome Canada's Data Release and Sharing Policies](#)?
 - Where research projects involve Indigenous peoples including First Nations, Métis and Inuit peoples, how well does the project incorporate Indigenous knowledge

systems (including ontologies, epistemologies and methodologies), to what extent is it carried out by and with Indigenous peoples, and is it being conducted in line with the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans, in particular, Chapter 9: Research Involving the First Nations, Inuit and Métis peoples of Canada. http://www.pre.ethics.gc.ca/eng/tcps2-eptc2_2018_chapter9-chapitre9.html

- Research Expertise
 - How appropriate is the expertise and track record of the research team in terms of realizing the research goals?
 - To what extent does the proposal include plans for the inclusion of new researchers, including those that are new to the area of genomics as well as early stage investigators (defined as being within five years of their first appointment allowing them to be an eligible individual as per [Genome Canada Guidelines](#))?
 - To what extent does the project incorporate the principles of equity, diversity and inclusion (EDI) by, for example, including participation of under-represented groups as part of the research team?
 - How well will different types of expertise be integrated?
- Research Support
 - How suitable are the available facilities, equipment and services (including services to be provided by Genome Canada supported Genomics Technology Platforms and/or other technology service providers)?
- Specific criteria for the **integration** of GE³LS Research into the overall proposal
 - To what extent does the GE³LS investigation address salient factors that will impact the advancement and application of the genomics research and to what extent are the GE³LS research questions supportive of the objectives and expected outcomes?
 - To what extent is the GE³LS research plan actually integrated, i.e., is it aligned with, and complementary to, the overall project goals? If the GE³LS research were taken out of the project would it make a difference to the project's viability?
 - How likely is it that the proposed disciplinary expertise, research strategies and methodologies taken together will contribute to a broader understanding of the research question and potential genomic-based solution(s)?

2. Benefits for Canada

- Deliverables
 - To what extent have the applicants identified appropriate deliverables in terms of their potential to have impact on one or more of the sectors relevant to the competition?
 - What is the likelihood that the deliverables will be achieved by the end of the funding period?

- Expected Benefits
 - How significant are the anticipated benefits described in the proposal in terms of their potential of contributing to the sectors relevant to this competition?
 - How convincing is the assessment of the value of the benefits (including economic aspects, where applicable)?
 - Will the benefits be realized within a short time frame after the end of the project, taking into consideration what is reasonable for the proposed deliverables and the research area?
 - Are the benefits realistic and achievable within the time frame proposed?
- Strategy for realizing benefits
 - How strong is the plan for knowledge translation and development of benefits, i.e., how well does the plan explain the next steps of how the deliverables from the research will be transferred, disseminated, used, and/or applied to realize the social and/or economic benefits?
 - How closely aligned is the plan for knowledge translation with the GE³LS research and the overall deliverables and outcomes of the project?
- Expertise for realizing benefits
 - How appropriate is the expertise and track record of the team that will further develop and implement the strategy for realizing benefits?
 - To what extent are likely users involved in the project and the strategy to realize benefits?
 - If the strategy includes commercialization, to what extent has appropriate technology transfer expertise been included?

3. Management and Finance

- Management Plans and Expertise
 - How well does the management plan cover project governance, accountabilities of personnel, and processes for decision-making on research direction and strategy for realizing benefits?
 - How realistic is the project schedule given the likely need to “ramp-up” activities at the front end?
 - How credible is the management plan in terms of coordination of current and future partnerships?
 - Are the proposed arrangements with Genome Canada supported Genomics Technology Platforms and/or other technology service providers sufficiently articulated to ensure that the provider is able to complete the requested service(s) in the time frame required by the applicant?
 - To what extent do the project leaders have experience in managing large-scale projects involving research and the application of results?
 - How appropriate are the plans to ensure that an adequate number of highly qualified personnel (HQP), both support personnel such as technicians and trainees such as post-doctoral fellows, are available to meet the needs of the proposed research through recruitment and/or training?

- What is the likely effectiveness of the proposed plans for communicating within the project, with the Genome Centre, with collaborators and partners, and with the scientific community?
- **Budget and expenditure controls**
 - How reasonable is the proposed budget in terms of the anticipated level of effort and deliverables?
 - To what extent are the budget and proposed expenditures well-documented and eligible per the guidelines?
 - To what extent does the proposal provide assurance that expenditures from a funded project would be closely and critically monitored?
- **Financing from co-funders**
 - To what extent is the proposed co-funding plan well-documented, eligible and feasible?
 - Does the proposed co-funding directly support the objectives of the project?
 - How likely is it that the project will be able to secure at least 75% of the co-funding for eligible costs before the deadline for release of funds?



Natural Resources
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Appendix 2. Strategic Collaboration with Natural Resources Canada (NRCan)

Description

Genome Canada and NRCan will jointly support research projects developing genomic solutions for challenges and opportunities in the natural resources and environment sector through Genome Canada's 2020 Large-Scale Applied Research Project Competition. This funding opportunity builds on the complementary mandates of Genome Canada and NRCan and provides an opportunity to bring together and maximize the effectiveness of the research communities, infrastructure and resources supported by both organizations. This funding opportunity makes it possible to collaboratively carry out joint projects with NRCan researchers, where Genome Canada funds will support the Genome Canada eligible researchers and NRCan funds will support the NRCan researchers.

Background

NRCan seeks to enhance the responsible development and use of Canada's natural resources and the competitiveness of Canada's natural resources products. NRCan is at the forefront of forestry, energy and mining genomics-based innovation and research in Canada. Much of this leadership was enabled by a federal investment in the Genomics Research and Development Initiative (GRDI), which has been ongoing since 1999.

NRCan develops policies and programs that enhance the contribution of the natural resources sector to the economy, improve the quality of life for all Canadians and conduct innovative science in facilities across Canada to generate ideas and transfer technologies. NRCan is committed to improving a sustainable resource sector through our expertise in forests and forestry, minerals and mining, earth sciences, energy efficiency and energy sources.

Funds Available

- NRCan has agreed to provide approximately \$1.5 million to NRCan scientists for approved relevant Collaborative Projects funded by Genome Canada over a four year period from 2021 to 2025. As per the Financial Administration Act, a mechanism will be put in place to ensure that no Genome Canada funds flow to NRCan.
- While the NRCan contribution to a Collaborative Project does not have to be co-funded by other eligible sources, the availability of such co-funding will be taken into consideration as part of NRCan's internal assessment.
- NRCan funding, and any NRCan-approved co-funding obtained for use by NRCan scientists, will follow the applicable federal government and NRCan guidelines. In the event where such funding would be used to cover costs not considered eligible under Genome Canada's [Guidelines for Funding](#), the total amount of such costs will not be accounted as part of the Collaborative Project's budget.

Eligible Research Areas for NRCan Funding

NRCan investments in Collaborative Projects will focus in the following areas:

- Forest generation — developing innovative applications to accelerate development of productive and resilient trees.
- Forest protection — developing innovative diagnostic tools to enable rapid detection and management of invasive insects and diseases that threaten the health and ecological integrity of Canada's forests and forest sector.
- Soil biodiversity – developing tools to analyze genetic material in environmental samples in order to assess the impact of disturbances on forest ecosystems, and improve land remediation strategies after non-renewable resource extraction.
- Bioremediation – developing methods to trace groundwater contaminants from tailings and waste rock dumps to optimize treatment and reduce leaching.
- Bioleaching – metal recovery from ore (crushed rock) or tailings using the catalytic activity of ferrous iron- and sulfur-oxidizing chemolithotrophic bacteria. For example, there are Canadian gold projects that use tank bio-oxidation to enhance metal recovery, compared to pressure oxidation, the more conventional and higher-cost alternative.
- Oil spills and tailings treatments – development of knowledge and technology to minimize potential environmental impacts during resource extraction.
- Protecting resources - Improving response of heavy oil spills into water resources.

Process (for NRCan portion of Collaborative Projects only)

- A director-level committee will conduct an analysis for alignment at the registration phase, and an assessment for relevancy and approval at the pre-application phase.
- NRCan applicants must obtain support from their Director in advance of applying at each stage of their application.
- All projects involving NRCan researchers will be required to complete internal annual reporting for the entirety of the Collaborative Project.

For more information please contact:

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