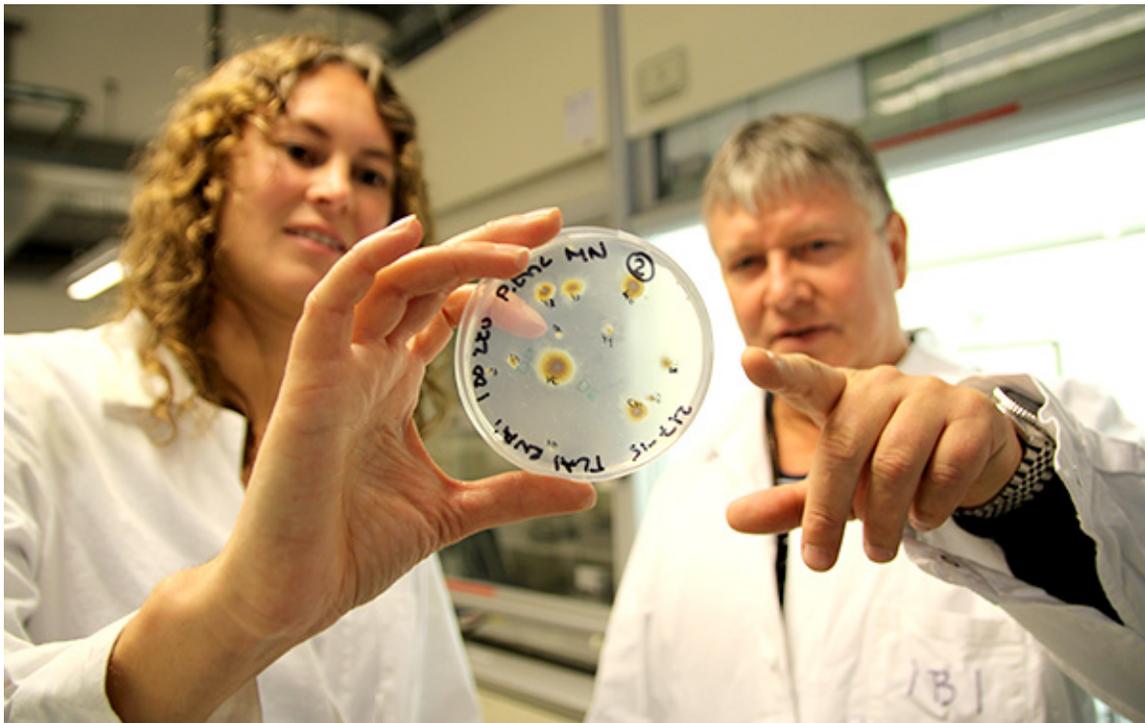


# Understand life – preserve the environment



Strategy 2018 – 2025 for the Institute of Biology (IBI), at the Faculty of Natural Sciences (NV), Norwegian University of Science and Technology (NTNU).

Adopted by extended management group on 08.06.2018.

## Reading Guide

The IBI strategy consists of three parts.

**Part 1** contains the vision, values, social mission and challenges.

**Part 2** deals with IBI's core tasks, consisting of: education and learning environment, research, innovation activities and dissemination.

**Part 3** considers priority area themes that intersect our core tasks. These include interdisciplinary collaboration, career and expertise, work environment and student welfare, and IBI's ability to grow and adapt.

A paragraph on realizing the strategic objectives concludes the strategy.

Parts 2 and 3 constitute the strategic objectives. The ambition for each area describes the situation IBI wants to find itself in at the end of the strategy period. Under each area, further development goals have been formulated and outline where IBI should focus its development efforts during the period.

In addition, IBI has developed a more detailed research strategy for selected focus areas related to four global challenges: climate change, loss of biodiversity, pollution and sustainable use of natural resources, including a comprehensive marine effort.



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**Part 1: Vision, values, social mission, key challenges and main objectives**

**Our Vision: Understanding Life – Preserving the Environment**

There is a great need for more knowledge of nature's diversity, connections and mechanisms to be able to *understand life* on earth. IBI will contribute high-quality research and teaching to significantly increase our knowledge and expertise about nature at all levels, from genes to ecosystems.

A greater understanding of life in all its forms is a prerequisite for preserving the environment. The earth is facing major challenges due to environmental impacts from human activity, and IBI will contribute to preserving the environment and to the sustainable development, use and management of natural resources.

In order to realize its vision, IBI will combine high quality with sufficient breadth within the basic biological disciplines of our research and education, and we will strengthen our interdisciplinary collaboration to contribute to a sustainable future. We will strengthen our efforts to provide the public with increased knowledge and an ability to understand and predict the effects of global climate challenges, loss of biodiversity, environmental pollution, and an increased competence to ensure sustainable management and use of land and water resources.

We will emphasize high quality, curiosity and relevance in our research and education, and we will promote equality and mutual respect.

Through its focus on climate, loss of nature and species diversity (biodiversity), pollution and sustainable use and management of natural resources, IBI will contribute especially to the following sustainability goals adopted by the UN:

- Goal 2: Zero hunger
- Goal 13: Climate Change
- Goal 14: Oceans
- Goal 15: Biodiversity, forests, desertification



### **Our values**

IBI designs its activities around NTNU's values of creative, critical, constructive and respectful engagement.

### **Our social mission**

IBI's operations support NTNU's work to fulfil the university's social mission. Our primary responsibilities lie in biological research and education, dissemination and innovation. IBI will contribute to a sustainable future through high-quality research and education in our basic disciplines and interdisciplinary cooperation nationally and internationally, with an emphasis on environmental protection and sustainable development and use of natural resources. We will utilize NTNU's main profile in science and technology and its interdisciplinary strength, and we will prioritize high quality and relevance in all aspects of the department's activities in our pursuit of the social mission.

### **Key challenges in 2018**

The university's activities take a long-term view. At the same time, national and global societal changes are extensive and the effects somewhat unpredictable. Societal developments are increasing the need for scientific and technological knowledge in tandem with an interdisciplinary approach. The NV Faculty has highlighted two particular areas of challenge that will be important for IBI during the current strategy period through 2025; these are society's need for expertise in sustainable development and our ability to continually develop activities that strengthen quality and relevance in education and research. In addition, the major global challenges of climate change, loss of biodiversity and environmental pollution are particularly important challenges for IBI's activities and social mission.

### **Contribute to sustainable development in business and society**

The world is facing major environmental and social challenges that have been formalized in the UN's sustainability goals. IBI will create the knowledge and expertise to safeguard the natural environment and sustainable resource use and management. Developing a

broad basic competence and the ability to think critically in society are also important tools to prepare us for future challenges and opportunities. Close cooperation with working life is mutually crucial in many areas, both to ensure relevant research and education and to develop and implement tomorrow's solutions. IBI must lead the way in our fields of expertise. In addition, the culture of collaboration, innovation and dissemination must be an integral part of our research and educational activities.

### **Quality at all levels**

The department must continuously strive to improve quality in order to deliver high-quality research and to educate students who can support the UN's sustainability goals, as well as contribute to society's needs for expertise today and in the future. Attention to quality in recruiting students and staff, the study environment and teaching, research



administrative protocols and processes, and the workplace environment is thus key. The study environment, teaching facilities and methodology, collaborative work within and across units, and simplification and digitization of administrative work are areas for potential improvement. We expect that the competition for research funding and the best heads will intensify in the future. Likewise, we expect that the pace of change in the world around us will require us to adapt faster than before. In order for IBI to assert its place in competing to create the best research and learning environment and to be an attractive partner, we must continue to develop and improve our activities. Quality at every level requires academically strong and creative employees with good collaborative skills, the right tools and work processes, the ability to implement new technology, shared goals and direction, stronger prioritization of resources, effective and inclusive processes, and an organization that is adaptable.

## **Part 2: Core tasks**

### **Education and learning environment**

IBI's educational and learning environment strategy has three pillars:

- Educating internationally outstanding students
- Quality of education
- Effective learning environment

#### ***Ambition***

IBI educates biologists who meet the needs of society, at national and international levels. IBI's graduates are our most important contribution to a sustainable future in which the development, use and management of natural resources, including food production, does not come at the expense of the environment. In a dynamic job market that places high demands on competence and flexibility, our students are sought after and fill a wide range of national and international positions in the public sector, industry and business. Biologists trained at IBI are noted for their solid and broad expertise in biology, effective collaboration skills, constructive attitudes and ethical awareness, which are critical qualities for solving complex global challenges.

IBI is the preferred place of study for talented future biologists. The education at IBI is recognized nationally and internationally. Our study programmes contribute to the department's selected sustainability goals, with a focus on understanding and predicting the effects of global challenges such as climate change, pollution, loss of biodiversity and contributing to sustainable food production and natural resource use and management. We provide our students with good tools to contribute to protecting the natural environment and terrestrial, freshwater and marine ecosystems. Solving complex problems and challenges and exploiting future land and aquatic opportunities will require our students to have expertise in the basic biological disciplines along with interdisciplinary understanding and teamwork skills. High-quality research-based teaching in and across the basic disciplines of evolution, ecology, behaviour, physiology, cell and molecular biology and biological systematics<sup>1</sup> provide a solid foundation in the field of biology. Basic studies are extended with cross-cutting subjects such as environmental toxicology and systems biology. Our interdisciplinary international master's programmes emphasize the links between the social, technological, ethical and natural science aspects of the global challenges. Students acquire forward-looking and innovative expertise for sustainable development, natural resource use and management and food production. Our education and research make a significant contribution to the NTNU Oceans and NTNU Sustainability strategic research areas, as well as to the efforts in biotechnology as an enabling technology.

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<sup>1</sup> IBI offers biological systematics education in partnership with the NTNU University Museum, which carries primary responsibility for the research in this area.

Rapid changes in society and technological developments demand flexibility and adaptability. IBI contributes to lifelong learning by developing and offering continuing and further education courses in line with the evolving needs of working life.

All teaching is research-based and is characterized by high academic quality and extensive use of hands-on learning methods. "Learning by doing" is a core principle of our learning environment, and teaching employs extensive use of interactive discussions, digital and other innovative tools, problem-based learning, practical laboratory and field work, state-of-the-art technology and methods, as well as skill-building in quantitative methods, statistics and modelling. The master's level also includes a significant focus on planning and conducting research, ethical awareness, critical interpretation of scientific results, correct scientific written and oral communication, and popular dissemination.

IBI's teaching environment is characterized by a culture of continual improvement that rests on extensive collaboration, support and sharing of experience between all involved parties, teachers, students, and technical and administrative support services. Didactic method and discipline content improvements are research-based. IBI has well-established routines to assure quality teaching.

Students at IBI experience a positive and inclusive learning environment characterized by engagement, a high degree of effort and mastery, collaboration and thoughtfulness. We ensure this involvement through well-organized learning areas, clear expectations of the students, consistent follow-up throughout students' course of study, and relevant learning activities and forms of assessment. Students are talented, take responsibility for their own learning and are actively involved in improving the teaching and study environment. The study completion rate is high with little dropout along the way. Up-to-date infrastructure and an effective and well-balanced technical and administrative apparatus support the teaching.



## **Development goals**

IBI will:

- Continue to develop the content, connections and progression of the programme portfolio so that courses reflect IBI's academic priorities and the needs of society in the best possible way.
- Strengthen cooperation within and across departments and with relevant actors in the public sector and in private work life to develop the educational programme.
- Promote and make visible the programme's educational profile to increase the recruitment of good students to our programmes.
- Strengthen the department's role as an attractive apprenticeship environment for students from all over the world.
- Continue and strengthen collaboration with outstanding international and national research and educational institutions, especially at master's and PhD levels, to increase the quality and robustness of the education and to increase student exchange.
- Contribute to lifelong learning by developing courses for continuing education in subject areas of high demand.
- Continue and strengthen efforts to raise staff teaching and guidance competency.
- Offer a stimulating learning environment with suitable laboratories and infrastructure, digital teaching tools and relevant teaching and assessment methods that align with departmental learning objectives.

- Develop identity and social cohesion in the study programmes through developing identity spaces and student workplaces.
- Increase the proportion of students who complete their programme within the normal length of study.
- Optimize technical and administrative support for teaching by continuously improving skills, simplifying and improving administrative protocols and processes, and appropriately sizing the support system.

## **Research**

IBI's research strategy builds on NTNU's research pillars:

- Developing talented researchers and excellent research environments
- Quality improvement throughout our organization
- Research within and across disciplines

## **Ambition**

IBI contributes significantly to new knowledge and understanding of nature's complexity, links and mechanisms, from gene to ecosystem levels. Fundamental research of a high international standard in the basic disciplines (cell and molecular biology, physiology, behaviour, ecology and evolution) and interdisciplinary collaboration with leading national and international research groups enable the department to contribute to greater understanding and an ability to predict the effects of global environmental challenges. The department emphasizes climate change, pollution and loss of biodiversity. The results of our research help to ensure sustainable natural resource development, use and management in land and marine settings. The department's research strongly supports NTNU's strategic research areas, especially NTNU Oceans, NTNU Sustainability and NTNU Biotechnology.

IBI emphasizes curiosity-driven basic research to contribute to a new understanding of basic biological processes. The research at IBI is of respected international quality and maintains a high ethical standard. IBI has several outstanding research groups and is regarded as an attractive partner for national and internationally recognized research groups, industry and the public sector. IBI's quality is reflected in its good reputation, in extensive publications in renowned international journals, and in the high number of attractive master's, PhD and postdoctoral graduates. Many of our research groups fare well in national and international competition arenas. The department has a significant leadership role and collaborates in national and international initiatives for outstanding research, especially large programmes and methods for outstanding research under the Research Council of Norway and the EU.

Our collaborative work with the business and public sectors is highly relevant for our strategic research focus. The proportion of projects from the public sector and the business sector is solid and growing. Our research data is stored and made available in accordance with current research policy, and all publications are open source.

IBI's academic groups are inclusive and cooperate closely within and across departmental subject areas, in addition to their extensive intra- and interdisciplinary collaboration in national and international arenas. Academic groups focus on quality and have a culture that promotes equality, mutual respect and consideration. They attract outstanding PhD candidates, postdoctoral fellows, researchers and engineers.

Employees in PhD, postdoctoral, research and recruitment positions constitute a very important part of departmental research. The doctoral programme maintains a high international level and recruits highly motivated candidates nationally and internationally. IBI focuses on close guidance and follow-up with PhD candidates, and the programme completion levels are high.

IBI's and NTNU's general and highly specialized research laboratories are equipped with modern scientific equipment, which is available to all relevant users. In addition, we have highly qualified technical staff who manage the department's research laboratories. IBI manages and maintains several unique long-term data series from natural terrestrial and aquatic systems. IBI takes advantage of NTNU's up-to-date laboratories and long-term data series through a high degree of interdisciplinarity and national and international cooperation.

### **Development objectives:**

IBI will:

- Prepare and implement a research strategy to strengthen the efforts of the selected global challenges, including a separate marine strategy.
- Promote the development of future Centres of Excellence (SFF), starting with strong academic environments having the aim of establishing new SFFs that are:
  - based on today's Centre for Biodiversity Dynamics
  - within the field of environmental toxicology
- Ensure good quality in programme breadth and create the foundation for emerging new outstanding research environments.
- Strengthen efforts to develop a broad range of methods for outstanding research and national and international competition arenas (e.g., ERC, other EU programmes, Centre for Research-based Innovation).
- Increase teamwork and optimize quality in funding application processes. Increase the volume of applications to national and international funding sources, especially to the EU Framework programmes.
- Increase the scope of grant-financed projects from the business community within relevant disciplines.
- Establish and maintain long-term collaboration with outstanding research groups nationally and internationally, with the goal of joint projects, publications and master's and PhD education.
- Strengthen internal IBI teamwork and collaboration with other NTNU departments, as well as research institutes like SINTEF and NINA, to solve interdisciplinary challenges.

- Increase publications generally and especially in highly regarded scientific journals. All publications should be open source (open journals, NTNU's own archive systems)
- Update PhD education and ensure its quality from a candidate's initial application, through admissions, coursework and project design, to supervision, completion and doctoral defence. The programme portfolio should be updated in relation to the department's academic profile. A mid-term evaluation will be implemented.
- Ensure that PhD and postdoctoral candidates are part of an international research environment. Facilitate research stays abroad and the exchange of candidates from foreign institutions to the department.
- Career plans shall be worked out for all job categories.
- Ensure that a good technical and administrative support system is available for planning and conducting research.
- Establish long-term plans for infrastructure maintenance and upgrades. Effective systems should be in place to ensure all employees have good access to the department's research equipment and spaces.

## **Innovation**

The innovation strategy rests on three pillars:

- Collaborating with established business
- Collaborating with the public sector
- Helping to create new business

IBI contributes to sustainable development in society through our research and education. Employees and students help to identify new business opportunities and inventions, innovative improvements to existing processes, and see their own field of study in a wider social context. IBI's academic groups and research projects contribute to innovations within and outside NTNU. The department is a professional and attractive research and collaboration partner that consciously safeguards the interests and rights of all parties.

IBI's education and research in the basic biological disciplines and interdisciplinary areas – including selected global challenges, marine food production, mapping, use and management of food production and natural resources, plus technology and method development – are key factors in ensuring sustainable development and innovation in society. IBI's strong academic groups cooperate with various community actors to better understand what types of expertise need to be met.

The students at IBI face issues that are relevant to working life, and they acquire tools and methods that are important for innovation. In this way, IBI's candidates become attractive employees who are able to contribute to the development and restructuring of existing and new working life.

### *Development objectives:*

IBI will:

- Increase our interdisciplinary research and collaboration with public and private sectors.

- Further integrate contact with life in the workplace into our education, and educate creative, innovative candidates for continuing growth in the public sector and industry.
- Reward patents and licenses along the lines of scientific publications.
- Extract the research potential from projects, academic groups and priority areas for innovative activity in society.
- Increase knowledge about and collaboration with NTNU Technology Transfer AS (TTO)

## **Dissemination**

The dissemination strategy is based on three pillars:

- Dissemination of results from research and artistic development to the research community and to students.
- Communication and outreach to share knowledge with the public.
- User-oriented communication of research aimed at specific groups who can apply the knowledge and technology in their work practice.

The university is funded by society to create new knowledge for understanding and using the world's resources. It is our responsibility to share new knowledge with those who are our clients: society as a whole, and society's public and private actors. Sharing knowledge makes it useful and enjoyable for more people, and increases understanding of the importance of research in society.

IBI contributes to a knowledge-based public dialogue, provides new insights and expertise for an increased understanding of life on earth, and brings expertise and willingness to conserve the environment and ensure sustainable natural resource use and management.

We provide the public and policymakers with an understanding of the importance of scientifically based knowledge and distribute our research, education and innovations through relevant channels.

IBI's outstanding academic environments and skilled dissemination and communication work helps to strengthen NTNU's reputation nationally and internationally. We are a visible and attractive partner for business and knowledge institutions and attract talented staff and students.

Public and user-oriented communication is considered an important and natural part of the work activity among our employees. Our students and graduates are important ambassadors for our studies and values and are the department's most important contributors towards spreading knowledge about nature, and thereby the skills and ethical awareness necessary for a sustainable future.

## Development goals

IBI will:

- Develop and contribute to initiatives aimed specifically at children and young people.
- Increase our participation in a fact-based social debate through feature articles, media posts and opinion statements.
- Develop student and staff outreach and communication skills by integrating dissemination activities as part of the course of study and work assignments.
- Increase interest in and recruitment to the field of biology through sharing our knowledge.



Part 3: Priority Areas

## Selected priority areas

### Interdisciplinary interaction

IBI values and encourages interdisciplinarity in education and research. We facilitate a collaborative and sharing culture within the department, at NTNU and with external partners. Collaboration with working life helps to ensure relevance in education and research, in addition to addressing some of society's needs for expertise and new development.

### Development goals

IBI will:

- Ensure relevance in our educational programmes by teaming with actors in working life and learning about their needs for future competencies.
- Actively work to lower organizational and financial barriers, and remove barriers to infrastructure use.
- Use incentives and reward systems that promote openness and a culture of sharing.

## **Recruitment, gender equality and expertise**

Staff and students comprise the department's most important resource. By 2025, we have achieved a good gender balance in all job categories and a culture that encourages high quality in all activity areas. We attract outstanding employees nationally and internationally.

Our academic groups are recognized for having high levels of expertise, for their inclusive and close teamwork in and across departmental disciplines, as well as extensive national and international collaboration within and across disciplines. The academic groups attract outstanding PhD candidates, postdoctoral fellows, researchers and engineers.

IBI facilitates employee skill building according to the department's needs and employees' requirements and wishes. Strategic personnel plans and staff development plans are important tools for accomplishing the strategy.

## **Development goals**

IBI will:

- Ensure an optimal recruitment process in order to hire the best applicants.
- Take the necessary steps to achieve a significant improvement in the gender balance in all departmental job groups.
- Focus especially on improving the gender balance in academia through measures that raise awareness of the challenges and facilitate career development for promising young women in academia, and through long-term and targeted work to recruit and retain talented women in the department.
- Help employees in recruitment positions succeed in an academic career within or outside NTNU.
- Make sure that all employees have career plans and facilitate skill building in line with the department's needs in all job categories.
- Motivate and cultivate employees to take on leadership roles.

## **Organization, leadership and adaptability**

IBI achieves good results through cultivating a culture that strives to grow and improve, and that cooperates in efforts towards shared goals and superior quality at all levels.

The institute has a clear and firmly rooted strategy where employees recognize the importance of their own efforts for achieving shared goals. The management is responsible for ensuring effective participation processes and structures, transparent decision-making, optimal use of the department's resources and an evolving working environment. Staff actively participate and take responsibility for implementing decisions in their primary areas of work. Our students and staff are trained to use progressive digital tools.

The financial situation is solid. Steady and good access to grant and contract research funded by national and international sources contributes to healthy strategic room for manoeuvre. All resources are used in accordance with our strategic priorities to ensure high quality in carrying out our social mission, education, research, innovation and dissemination.

## **Development goals**

IBI will:

- Have clear goals and strategies that are firmly rooted in the organization, as well as inclusive processes for developing and implementing annual measures to achieve the goals set for the period.
- Manage resources in a way that contributes to increased productivity and enables strategic prioritizing and renewal at the department.
- Have an organizational structure that supports and increases the department's ability to attain the goals that have been set out.
- Employ effective digital tools and standardize routines and work processes.
- Continually develop research and educational offerings to meet the challenges of the future.

## **Work and study environment**

IBI has motivated, committed and competent staff and students. Management, staff and students together contribute to a health-promoting study and work environment characterized by sharing, mutual respect and care, high quality and solid work effort. Management works systematically on issues related to health, the environment and safety. The opportunity for staff and students to actively participate in important processes is ensured through information channels, representative forums, permanent councils and committees, ad-hoc committees and staff conversations.

## **Development goals:**

IBI will:

- Ensure that NTNU's values permeate department activities: we will be critical, constructive, creative and respectful. IBI strives to encourage collaboration, generosity and inclusion, which are important pillars of our department culture. Management at all levels will prioritize time and resources for this and set a good example for their co-workers.
- Follow up on the work environment surveys through constructive collaborative processes that engender a high degree of participation and accountability.
- Have a good and safe physical working environment in laboratories, offices and in the field, as well as a positive and professional HSE culture.
- Provide good guidance and facilitate well-being and mastery for all students.

- Facilitate collaboration and an inclusive environment among students through field trips, fieldwork and comfortable meeting places on campus.

## **Campus and infrastructure**

Equipment and infrastructure are important pillars of the department's activities. Long-term plans for the procurement and operation of equipment and infrastructure underpin applications for various sources of equipment funding.

IBI's academic environments are collocated in an appropriate manner. An agreement is in place to bring together marine-dependent research and teaching activities in one location.

## **Development goals**

IBI will:

- Work to move Trondhjem Biological Station and SeaLab to one site.
- Ensure that laboratory and equipment infrastructure effectively meet the needs of the core activities.
- Have highly qualified technical staff managing the research and teaching laboratories.
- Work for an optimal balance between scientific, technical and administrative staff.

## **From strategy to reality 2018 – 2025**

In order to strengthen IBI's contribution to NTNU's strategic initiatives and the sustainability goals adopted by the UN (Goal 2: Zero hunger, Goal 13: Climate Change, Goal 14: Oceans, Goal 15: Biodiversity, forests, desertification), the department has prepared its own research strategy that more specifically reflects our contribution to global challenges, climate change, loss of biodiversity, pollution and sustainable development, and natural resource use and management. In addition, we have prepared a separate research strategy for our contribution to the strategic research area NTNU Oceans. We will develop action plans for one year at a time. Midway through this strategy period, we will assess our progress and whether we need to adjust the strategy.

