

Table 1 Core questions in the strategic research and development hierarchical structure

Overall goal

How should we achieve the conservation of biodiversity and the sustainable use of biological resources for the sake of humankind's survival?

a. Basic research

- (a1) How does biodiversity support life on Earth?
- (a2) What sorts of living organisms gather where, and ecosystems with what sort of structures and functions in ecosystem have been built up?
- (a3) How do all the living organisms lead their lives and interact with each other?
- (a4) Where, how many, and what sort of organisms are there on Earth?
- (a5) What evolutionary and biological processes have created biodiversity?

b. Development of intellectual fundamentals

- (b1) How best should we promote strategic and systematic development of intellectual fundamentals concerning biodiversity research?
- (b2) How far can we promote the collection, preservation, and provision of natural resources?
- (b3) How far can we promote the improvement of information on biodiversity?
- (b4) How far can we implement long-term monitoring of biodiversity changes?
- (b5) What sort of basic research and techniques needs to be developed to ensure the quality of the intellectual fundamentals and support their systematic development?

c. Prediction of biodiversity changes

- (c1) How do human activities cause changes in biodiversity?
- (c2) To what extent do natural disturbances cause changes in biodiversity?
- (c3) How do ecosystems react to or change as a result of their fragmentation, isolation? ("The ecosystems scenario.")
- (c4) How do the environments around living organisms change as a result of climate change, chemical pollution, waste pollution, disturbances caused by invasive alien species and living modified organisms, land changes, water pollution and changes in water circulation? (The environmental changes scenario.)
- (c5) How do population, industrial structures, food and energy demands and land use change in the future? ("The social and economic scenario".)

d. Impact assessments of biodiversity changes

- (d1) What sort of losses in biodiversity represents a threat to humankind's survival?
- (d2) How can human society redress the effects of declining biodiversity?
- (d3) How do declining species diversity affect the services biodiversity brings to mankind?
- (d4) What is biodiversity's value?
- (d5) What is the relationship between biodiversity and ecosystem functions?
- (d6) What are the effects of biodiversity changes on human society such as agriculture, industry, safety, and culture?
- (d7) What are the effects of declining biodiversity on human health?

e. Conservation of biodiversity, and techniques and methods for its restoration

- (e1) How can we conserve biodiversity?
- (e2) How can we introduce adaptive management system?
- (e3) How can we pursue measures to prevent any further increase of the number of endangered species, and to ensure their recovery?
- (e4) What sort of habitat conservation technologies and systems should we develop?
- (e5) What sort of technologies for reproduction and recovery of population and restoration of genetic diversity should we develop?
- (e6) How far can we conserve the indigenous biodiversity of a region in response to that region's characteristics?
- (e7) What sort of natural restoration technologies should we develop?
- (e8) How can we select the important factors that constitute a regional biodiversity and assess their suitability as habitats?
- (e9) How can we provide scientific evaluations of the efficacy of these conservation technologies and regulations?

f. Sustainable use and management of land and natural resources

- (f1) How should we plan ways of using natural resources and land that are in keeping with the conservation of biodiversity?

- (f2) How can we develop land management systems using social, economic and cultural incentives?
- (f3) How can we introduce a precautionary approach to land use and natural resource development?
- (f4) How can we secure sustainable agricultural, forestry and fisheries, and healthy biodiversity?
- (f5) How can we manage watersheds so that water resources, disaster prevention, and biodiversity are balanced?
- (f6) How can we secure a safe and comfortable living environment using bio-functions?
- (f7) How can we plan cities and regions that pay attention to the conservation of biodiversity?

g. Sustainable use of biological resources, and policies for that goal

- (g1) How we should pursue the sustainable use of biological resources?
 - (g2) What sort of policies should be proposed for the sustainable use of biological resources?
 - (g3) How can we ensure improvement and quality assurance in biological resources, access to them, and the fair and equitable sharing of benefits arising from the use of them?
 - (g4) How can we optimize diverse use of biological resources while giving consideration to the trade-offs in cost and benefit, between environment, economy and society?
 - (g5) How far can environmental burdens be decreased by biotechnology?
 - (g6) How can we build biotechnologies and systems that are practical from the viewpoint of LCA?
 - (g7) How can we build a system for making overall evaluations of the efficacy and impact on biodiversity of new biotechnology?
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Table 2 Ongoing R&D Themes supported by each ministry in FY2003

No.	Ministry	Category	Issue
C01	MOE	a	Study on a mechanism for conservation of biodiversity in watershed landscape.
C02	MOE	a	Study on mechanism governing biodiversity in biological communities.
C03	MOE	a	Development of a method to monitor genetic diversity among wildlife.
C04	MEXT	a	Study on biological production and material cycle in a deep-sea ecosystem.
C05	MEXT	a	Study on measurement of marine-ecosystem.
C06	MEXT	a	Study on a microbial ecosystem dependent on hydrothermal activity.
C07	MEXT	a	Interactions between natural environment and human social systems in subtropical islands.
C08	MEXT	a	Reconstructing the concept of symbiosis:A historical approach to the cases in the far eastern archipelago and surrounding areas.
C09	METI	b	Construct the genetic resource library of unidentified microbes based on genome information.
C10	MEXT	b	National BioResource Project
C11	MEXT	b	Promotion of BioResource-related projects
C12	MOE	b	Study on aquatic-life toxicology to establish environmental water quality standards for protecting aquatic life.
C13	MILT	b	Promotion of seashore life census.
C14	MILT	b	Survey and study on land ecology using laser air survey-Taking Shirakami Mountains as an example.
C15	MAFF	b	Survey of environmental information related to agriculture and rural areas
C16	MAFF	b	Development of database of natural resources information on agriculture, forestry and fisheries.
C17	MAFF	b	Development of database of natural resources information on agriculture, forestry and fisheries.
C18	MAFF	b	Unraveling factors causing fluctuations of marine biological resources and development of high-precision predictions.
C19	MOE	c	Study on the selection of biodiversity conservation area of the coral reef
C20	MOE	c	Study on changes and dynamics of natural environment at Natural World Heritage Sites.
C21	MAFF	c	Elucidation and evaluation of the functionalities in agro-ecosystems.
C22	MAFF	c	Impact assessment of agricultural activities on the changes of agro-ecosystems and their modeling.
C23	MAFF	c	Development of a solar house using an air-film structure.
C24	MAFF	c	Monitoring and predicting global warming.
C25	MAFF	cd	Impacts and risks of global warming.
C26	METI	cg	Study on risk management of recombinant organisms in industrial uses.

No.	Ministry	Category	Issue
C27	METI	cg	Technological innovation for environmentally friendly industrial system using biotechnology (Development of monitoring methods for microorganisms in the environment).
C28	MOE	d	Study on the habitat assessment models and evaluation procedure for biodiversity conservation
C29	MOE	d	The study of the mechanism of biodiversity decrease caused by invasive species
C30	MOE	d	Investigation of migration routes and habitats of migratory birds using advanced information and communication technology
C31	MOE	d	Studies on gene transfer and influence of biological diversity by field application of living modified organisms
C32	MOE	d	Preliminary study on environmental safety assessment of genetically modified crops-analysis of rice-pollen dispersal in agricultural field.
C33	MOE	d	Study on ecological influence assessment of generically-modified organisms.
C34	MOE	d	Nature-friendly water and material cycle.
C35	MILT	d	Study on the current status of pollution by toxic chemicals in coastal sediments and its impact assessment to coastal ecosystems
C36	MAFF	d	Risk assessment on toxic chemicals in agricultural and fishery ecosystems.
C37	MEXT	d	Study on impact of environmental change on biodiversity in the Antarctic land ecosystem.
C38	MOE	d	Global taxonomy initiatives for conservation of biodiversity in Asia and Oceania
C39	MOE	d	Survey on technical development related to the influence on a land ecosystem of pesticides.
C40	MOE	d	Unraveling mechanism reducing biodiversity and its conservation.
C41	MOE	d	Study on influence of pathogenic organism on wildlife population.
C42	MEXT	d	Sustainability and biodiversity assessment on forest utilization options.
C43	MOE	e	Research on the rehabilitation in the Landscape level of degraded tropical forest
C44	MOE	e	Studies on ecosystem management approach in tropical landscapes
C45	MOE	e	Study on the influence on wildlife and ecosystem functions of reed-bed management.
C46	MILT	e	Quantitative study on habitat environment in stream ecosystems.
C47	MILT	e	Study on technology for improving coastal environment by enhancing self purification activities in tidal flats and shallows in coastal waters
C48	MILT	e	Study on restoration technology of natural environment for streams and lakes.
C49	MAFF	e	Investigation of ecosystem conservation technologies
C50	MAFF	e	Development of technology to restore and improve water and material cycles, and ecosystem functions.
C51	MILT	ef	Development of nature-friendly technology to improve the national land.
C52	MAFF	eg	Gene-bank project on biological resources for agriculture.
C53	MAFF	f	Environmentally-friendly improvement project of agriculture and rural areas

No.	Ministry	Category	Issue
C54	MAFF	f	Technological verification for the proper population management applied to wildlife.
C55	MAFF	f	Unraveling relationships between management systems of agriculture and forestry area, and suitable wildlife habitat.
C56	MAFF	f	Unraveling occurrence factors of wildlife damage on agriculture and forestry, and development of methods to predict and reduce the damage.
C57	MAFF	f	Unraveling water and material cycle processes from forest to coasts.
C58	MAFF	f	Development of a water-circulation and -transportation model from forests to coasts.
C59	MAFF	f	Development of a integrated model of the water circulation and ecosystem change.
C60	MAFF	f	Development of management technology for the watershed environment.
C61	MAFF	fg	Study on recycling biomass-resources at the country level.
C62	MOE	g	Study to establish a new resource-cycle system by transforming degraded recycled-paper fibers into nano-particles.
C63	MOE	g	Development of recycling technology to sterilize food-industry wastes by sequential micro-wave irradiation under low pressure.
C64	MOE	g	Reassessment of disposal techniques by evaluating microbial activity.
C65	MOE	g	Research and development on social technology for food recycling.
C66	MOE	g	Development of technology to transform garbage disposal into chicken feed by high-pressure decomposition.
C67	MOE	g	Study on extended use of wood wastes.
C68	METI	g	Bioprocess engineering project.
C69	METI	g	Development of fundamental technologies for controlling the process of industrial material production by plants.
C70	METI	g	Technological innovation for environmentally friendly industrial system using biotechnology (Development of a technological infrastructure for industrial bioprocesses)
C71	METI	g	Technological innovation for environmentally friendly industrial system using biotechnology (Development of technology for analyzing and controlling the mechanism of biodegrading and processing.)
C72	METI	g	Promoting access to genetic resources based on Convention on Biological Diversity.
C73	MILT	g	Survey on recycling technology to transform organic wastes into useful by using bio-solids.
C74	MAFF	g	Development of comprehensive management technology to prevent cadmium absorption and accumulation from major crops.
C75	MAFF	g	Development of decomposition and elimination technology for hazardous chemicals in agriculture, forestry, and fishery ecosystems.
C76	MEXT	g	Ecomolecular Science Research
C77	MAFF	g	Development of mitigation techniques to cope with global warming.
C78	MAFF	g	Development of technology recycling waste from the agriculture, forestry and fisheries industry.

No.	Ministry	Category	Issue
C79	MAFF	g	Local systemization of biomass recycling and its assessment method.
C80	MAFF	g	Development of recycling technology for organic wood-processing wastes.
C81	MAFF	g	Development of recycling technology for food wastes.
C82	MAFF	g	Development of recycling technology for organic livestock excreta.
C83	MAFF	g	Development of recycling technology for fish-processing wastes.
C84	MAFF	g	Development of technology to produce biomass-energy for agriculture and forestry.

MPHPT: Ministry of Public Management, Home Affairs, Posts and Telecommunications

MEXT: Ministry of Education, Culture, Sports, Science and Technology

MHLW: Ministry of Health, Labour and Welfare

MAFF: Ministry of Agriculture, Forestry and Fisheries

METI: Ministry of Economy, Trade and Industry

MLIT: Ministry of Land, Infrastructure and Transport

MOE: Ministry of the Environment

Table 3 Future R&D Issues planed by each ministry

No.	Ministry	Category	Issue
F01	MOE	a	Fundamental survey on natural environmental for environmental assessment.
F02	MOE	a	Recognition of wild-life locality by gene sequences.
F03	MOE	a	Unraveling physiology and ecosystems of preserved animals.
F04	MAFF	a	Investigation biological functionalities and development of application technologies for agro-environmental conservation.
F05	MAFF	abg	Unraveling marine ecosystems and developing technology for sustainable use of marine-resource.
F06	MEXT	b	Study on technology for monitoring marine ecosystems with sea-floor observative stations.
F07	MEXT	b	Study on marine-life survey using an unmanned submarine controlled with artificial intelligence and its technological improvement.
F08	MEXT	b	Survey on marine-life distribution and functions using a submarine and drill-ship, and development of micro-sampling and drilling instruments.
F09	MOE	b	Survey on transplant guidelines for animals and plants.
F10	MOE	b	Survey on environmental conservation guidelines for diverse ecosystems.
F11	MOE	b	National mapping of biodiversity based on analysis of correlation between wild-life habitats and earth covering.
F12	MOE	b	Development of technology for animal identification and management by microchips.
F13	MAFF	b	Exploration of indicator-species to estimate the fluctuation of biodiversity in agro-ecosystems.
F14	MILT	bc	Risk assessment of watershed chemicals and study on risk-communication.
F15	MILT	bcef	Unraveling dynamics of nutrient salts in watersheds, streams, and coasts, and study on ecosystem conservation management.
F16	MAFF	be	Development of technology to monitor and conserve endangered species in secondary natural environment.
F17	MAFF	bg	Exploration and release of bioremediation organisms for environmental conservation and technological development for their use.
F18	MOE	cd	Ecological assessment influenced by invasive species or genetically-modified organisms.
F19	MAFF	cd	Environmental impact assessment of invasive alien species and development of preventive technology in agro-ecosystems.
F20	MAFF	cd	Impact assessment of genetically modified organisms on biodiversity and development of new assessment methods for environmental safety.
F21	MOE	d	Development of quantitative assessment for the environment influencing upper, typical, and special species of ecosystem.
F22	MOE	d	Development of quantitative assessment method of conservation measures for ecosystems.

No.	Ministry	Category	Issue
F23	MAFF	cd	Elucidation of the spatial distribution of species and their ecological risk assessment.
F24	MAFF	de	Assessment of influence on biodiversity of extensive farming in central upland areas and development of conservation and renovation technology.
F25	MILT	e	Study on technology improving coastal environment to conserve biodiversity at coasts.
F26	MILT	e	Development of methods for survey on the relationships between water management and water environment.
F27	MOE	e	Study on environmental restoration in watershed landscapes.
F28	MOE	e	Study and technical development on easing the influences of foreign species on ecosystems.
F29	MAFF	e	Study on conservation of marine-ecosystem.
F30	MAFF	f	Unraveling ecological service-functions by creating an experimental system in central uplands.
F31	MILT	f	Study on understanding seashore ecosystem to improve seashore facilities that are compatible with conserving natural habitats and biodiversity. (tentative title).
F32	MAFF	f	Technical development of sustainable agriculture and field management that is harmonious with conservation of nature.
F33	MAFF	f	Enlightening farmers and farming-area residents on incentives for biodiversity conservation.
F34	METI	g	Promoting practical use of biomass and biomass-assisted technology.
F01	MOE	a	Fundamental survey on natural environmental for environmental assessment.

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Table 4 Registered Initiative Issues related to Biodiversity

No.	Ministry	Category	Issue
1	MEXT	c	Frontier Research System for Global Change
2	MEXT	b	Observation in the Antarctic
3	MEXT	cef	Research projects on global warming
4	MEXT	c	Observation study on the sea-surface material balance of GHGs by marine research vessels
5	MEXT	b	Observation in the Antarctic
6	MAFF	c	Integrated study for terrestrial carbon management of Asia in the 21st century based on scientific advancements
7	MAFF	c	Evaluation of vulnerability of natural ecosystems to global warming
8	MILT	f	Study on the evaluation of carbon removals by forests under Kyoto protocol
9	MOE	c	Iron fertilization-feasibility as an option for CO ₂ mitigation, and effects on marine ecosystems
10	MOE	e	Studies on long term variation of ocean ecosystem/climate interactions based on data collection
11	MOE	c	Research on sustainable land management in atoll island countries
12	MOE	c	Preliminary studies on short- and long-term responses of the medaka fish to the global warming
13	MOE	c	A FACE (free-air CO ₂ enrichment) study to predict the impacts of atmospheric CO ₂ increase on agricultural ecosystem
14	MOE	c	Effect of Climate Change on the Epidemics of Arthropod-Borne Viral Diseases
15	MOE	c	Study on transparent and Verifiable Method of Evaluating Carbon Sinks
16	MOE	c	Unraveling influence of atmospheric carbon-dioxide increase on an agricultural ecosystem by the FACE experiment
17	MOE	c	Study on influence of global warming on the epidemic of vector-borne viral diseases
18	MOE	c	Study on the assessment of carbon sink by a transparent and verifiable method
19	METI	g	Development of transgenic plants for production of industrial materials
20	METI	g	Technological innovation for environmentally friendly industrial system using biotechnology
21	METI	g	Bio-catalyst project

No.	Ministry	Category	Issue
22	METI	g	Development of transgenic plants for practical application
23	MAFF	gf	Assessment of influence of global warming on agriculture and fishery and technological development to cope with it
24	METI	g	Validation of non-exploited energy such as biomass and its feasibility study
25	METI	g	Development of high efficiency biomass converting process
26	MAFF	f	Assessment of influence of global warming on agriculture and fishery and technological development to cope with it (Technological development to cope with global warming)
27	MAFF	cf	Assessment of influence of global warming on agriculture and fishery and technological development to cope with it (Unraveling influence and risk of global warming)
28	METI	g	Development of carbon capture and recycling technology
29	METI	c	Development of risk evaluation methodology for marine carbon sequestration
30	METI	g	Development of carbon sequestration technology using waste paper recycling process
31	METI	cg	International research collaboration program on global environment
32	METI	g	Research fund to promote industrial technology development for the implementation of the Kyoto protocol
33	MOE	cg	Iron fertilization-feasibility as an option for CO ₂ mitigation, and effects on marine ecosystems
34	MOE	g	Development of GHG Sink/Source Control Technology through Conservation and Efficient Management of Terrestrial Ecosystem-Intermediate to long-term strategy for the stabilization of atmospheric GHG concentration
35	MOE	e	Research on the rehabilitation in the Landscape level of degraded tropical forest
36	MAFF	g	Study on biorecycling of wastes from agriculture and fishery sector (Development of innovative reduction and recycling technology of food wastes)
37	MAFF	g	Technological development to recycle fishery-processing wastes
38	MAFF	g	Development of food waste recycling technology and establishment of the waste recycling system
39	MAFF	g	Development of technology for the recycling of wastes from agricultural and fishery processing plants
40	MAFF	g	Study on biorecycling of wastes from agriculture and fishery sector (Technological development to build an environmentally-friendly ecosystem in farming and fishing villages)
41	MAFF	g	Technological development to recycle organic wastes such as livestock excreta

No.	Ministry	Category	Issue
42	MAFF	g	Technological development to recycle organic wastes produced by wood industry
43	MAFF	g	Study on development of an assessment method on political measures related to recycling of organic wastes produced by agriculture
44	MAFF	g	Study on biorecycling of wastes in agriculture and fishery sector (Establishment of local social system for biomass recycling and development of its assessment method)
45	METI	g	Development of technology to produce bacteriocins from distilled-spirit lees for the use in food preservation
46	MILT	g	Study on technological measures for the establishment of local waste recycling system
47	MILT	g	Establishment of environment-friendly resource recycling system in snowy cold regions
48	MOE	g	Technological development to stabilize and reduce risk in landfill sites and study to establish an assessing method
49	MOE	g	Study on the development of technology and a system to transform organic wastes into resources
50	MOE	g	Study on comprehensive monitoring of cycling resources and/or wastes using bioassay techniques
51	MOE	g	Technological development of a system to remove and/or recover nitrogen and phosphorus from water treatment plants
52	MOE	g	Development of a simplified management system for waste water treatment plant
53	MOE	g	Development of an energy-, cost-, and management-saving system in developing countries
54	MOE	g	Development of environment biotechnology (including physico-chemical processing) to create better environment
55	MEXT	g	Research and development of coastal ecology and its exploitation
56	MEXT	g	Environmental sciences study (Development of numerical simulation system for environments, study on advanced environmental analysis and development of techniques for environmental monitoring, preservation and recovery)
57	MEXT	c	Multi-Disciplinary Research for Understanding Interactions between Humans and Nature in the Lake Biwa-Yodo River Watershed
58	MEXT	f	Ecomolecular Science Research
59	METI	c	Study on cleaning soil pollutants
60	MAFF	g	Development of environmentally sound technology for the management of water-cycle in watershed areas and ecosystems in agriculture, forestry and fishery sector (Development of technology to renovate and enhance functions of ecosystems and development of methods to manage ecosystems in watershed areas)

No.	Ministry	Category	Issue
61	MAFF	g	Development of environmentally sound technology for the management of water-cycle in watershed areas and ecosystems in agriculture, forestry and fishery sector (Monitoring of water- and material-cycle and ecosystems in watershed areas, and unraveling and assessment of their functions)
62	MAFF	g	Development of environmentally sound technology for the management of water-cycle in watershed areas and ecosystems in agriculture, forestry and fishery sector (Modeling to manage water- and material-cycle and their ecosystems in watershed areas)
63	MILT	g	Development of environmentally friendly land-use technology
64	MILT	c	Development of an advanced information system on closed inland sea ecosystem
65	MILT	e	Study on technology for improving coastal environment by enhancing self purification activities in tidal flats and shallows in coastal waters
66	MILT	c	Study on the management of closed inland sea ecosystem
67	MILT	c	Tokyo Bay restoration project
68	MILT	c	Tidal flats restoration project in the city seaside part
69	MILT	e	Study on nature restoration technology to in river and lakes
70	MILT	e	Research and development of environmentally-friendly ocean vessels (research and development of new type of non-ballast vessels)
71	MOE	f	Study to recover watershed and urban areas
72	MOE	cg	Study to recover watershed and urban areas
73	MOE	g	Study to recover watershed and urban areas
74	MEXT	ef	Ecomolecular Science Research
75	MEXT	ef	The project to design sustainable management and recycling system of biomass, general and industrial wastes
76	MHLW	ef	Research on chemical risk
77	MAFF	f	Development of comprehensive management system of hazardous chemicals in agriculture and fishery ecosystems (Development of comprehensive management technology to prevent cadmium from being absorbed and accumulated in major crops)
78	MAFF	bf	Development of comprehensive management system of hazardous chemicals in agriculture and fishery ecosystems (Risk assessment of hazardous chemicals in agriculture and fishery ecosystems)
79	MAFF	ef	Development of comprehensive management system of hazardous chemicals in agriculture and fishery ecosystems (Degradation and removal of hazardous chemicals in agriculture and fishery ecosystems)

No.	Ministry	Category	Issue
80	METI	bef	Development of a high-precision and rapid assessment system for hazardous chemicals
81	METI	f	Development of assessment and testing methods for effects of environmental endocrine disruptors
82	MILT	f	Study on degradation of endocrine disrupting chemicals by controlled microorganism communities
83	MILT	e	Study on the fate and transport of toxic chemicals in coastal sediments and its impact on coastal marine ecosystems
84	MOE	e	Development of risk assessment and testing method of endocrine disrupting chemicals and promotion of international collaboration
85	MOE	c	Project to assess the current status of pollution by endocrine disrupting chemicals
86	MOE	e	Risk assessment and management of endocrine disrupting chemicals and dioxins
87	MOE	e	Survey and study on environmental risk of chemicals
88	MEXT	c	The Project for Sustainable Coexistence of Human, Nature and the Earth
89	MEXT	cf	Research projects on global water cycle
90	MEXT	b	Observation in the Antarctic
91	MOE	bc	Asia Pacific Environmental Innovation Strategy Project

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Table 5 Examples of Future R&D Issues discussed in the Working Group

No.	Category	Issue
1	a	Inventory of species
2	a	Ecological genome project for the better understanding of ecology and evolution of wild animals, and their conservation and exploitation
3	a	Study on the biological interaction between species by large scale ecological experiments at the site of invasive species eradication
4	a	Study on biological interaction network between species
5	a	Functions of microorganism-diversity causing eutrophication in land water
6	a	Relationship between freshwater biodiversity and gene transfer ratio
7	ab	Genomics, proteomics, and metbolomics
8	b	Design of an information infrastructure for water- and material-cycles in organisms and habitats, and their strategic monitoring
9	b	Information science on biodiversity (digitizing and managing information)
10	b	Monitoring biodiversity (Development of monitoring methods and networking)
11	bc	Survey on the current status of genetic disruption
12	bf	Monitoring system to prevent endangerment of native species in agricultural ecosystems
13	c	Prediction of biodiversity fluctuations (Socio-economic backgrounds and mechanisms)
14	c	A model to predict biodiversity and ecosystem fluctuations
15	c	Study to assess influence of wastes on ecosystems and biodiversity
16	c	A prediction method of organism and ecosystem fluctuations in water- and material-cycles in rivers, lakes, fields, forests and coasts in response to land-use change
17	c	Comprehensive study to elucidate key-factors that govern the soundness of lake ecosystems
18	c	Invasion paths and proliferation processes of foreign plants
19	c	Relationship between humans and biodiversity: Improvement of natural environment and its interaction with humans
20	cd	Methods to assess and predict influence of water pollutants on organisms and ecosystems
21	ce	CDM and biodiversity
22	cf	Import, transport and use of alien species and its environmental impact
23	d	Relationship between human health/hygiene and biodiversity
24	d	Fluctuation of biodiversity and ecosystems and its feed-back effects on global climate and water cycles
25	d	Assessment on impact of global fluctuations of water cycle on biodiversity

No.	Category	Issue
26	d	Biodiversity and ecological functions
27	d	Multipurpose use of biodiversity (economic analysis)
28	d	Introduction of genetically-modified organisms and alien species to deserted lands and assessment of its environmental impact
29	d	Biodiversity and ecological service
30	de	Prevention of desertification of arid land, and conservation of biodiversity and biological resources
31	e	Renovation technology for natural environment incorporating bio-processes, and renovation and management of water- and material-cycles and lands
32	e	Use of biological resources and residential life in developing countries
33	e	Revegetation technology with emphasis on biodiversity
34	e	Study on reorganization of symbiotic biological interactions at the site of nature restoration
35	e	Management of alien species
36	e	Protecting wildlife that uses a large habitat
37	e	Conservation of endangered species
38	e	Conservation of endangered species in a secondary natural environment
39	e	Development of sustainability index and biodiversity
40	e	Setting targets for nature renovation and a collaborative governing body, and innovative study applicable to practical ecological technologies
41	ef	Integrated pest management
42	ef	Management methods of water-cycle systems and fields, such as national lands: from the view point of biodiversity conservation and nature renovation
43	f	Ecological education using agricultural ecosystems
44	f	Systematic understanding of relationship between changes of national lands and natural ecosystems: understanding of basic structure of environmental change
45	f	Diversity of species, ecosystems and regional development
46	f	Sustainable agriculture harmonized with biota conservation and development of agricultural land management technology
47	f	Development of water resources and conservation of biodiversity
48	f	Harmonization of nature conservation and land use for food production
49	f	Biodiversity conservation strategy for the regions where there is a pressing need for water- and material-cycles change to promote social development
50	f	Land management under population decline and conservation of biodiversity
51	f	Management policy on biodiversity in underpopulated central upland areas
52	f	Incentives to farmers and farm-land residents for biodiversity conservation

No.	Category	Issue
53	f	Ecological impact analysis of undermanagement of nature and development for conservation and renovation technology
54	f	Policy on biodiversity conservation in national land planning and national land management planning
55	f	National land design and biodiversity
56	f	Sustainability and biodiversity of ecosystems in agriculture and fishery
57	f	Building ecological networks using water-channel networks
58	f	Ecosystems and emotional education
59	f	Conservation of ecosystems and amenity
60	f	Biodiversity and regional traditional culture and industry
61	f	Cultural aspects of biodiversity (including languages and religions)
62	f	Animal and plant therapy (ecological therapy)
63	g	Improvement of national science and technology infrastructures to preserve and share biological resources
64	g	Dissemination of research guidelines for obtaining foreign biological resources
65	g	Development of green chemistry (manufacturing technology using biological process)
66	g	Development of green biotechnology (green agricultural technology)

Table 6 State of the deliberations of the Working Group on Living Organisms and Ecosystems Research and Development

1st meeting, July 30, 2003

- (1) Promotion of environmental R&D in the Council of Science and Technology Policy
- (2) The Working Group on Living Organisms and Ecosystems Research and Development
- (3) Formatting the working group
- (4) Domestic R&D
- (5) Organizing the points in question

2nd meeting, September 16, 2003

- (1) The state of living organisms and ecosystems R&D
- (2) Future activities

3rd meeting, October 23, 2003

- (1) The scope of studies on living organisms and ecosystems R&D
- (2) Biodiversity research:
 - Biodiversity research strategy
 - On-site biodiversity
- (3) Vital issues in the environment and their links with living organism and ecosystem research

4th meeting, November 11, 2003

- (1) The scope of studies on living organisms and ecosystems R&D
- (2) Vital issues in the environment and their links with living organism and ecosystem research
- (3) Approaches to biodiversity research strategies
- (4) How to proceed with the work

5th meeting, December 9, 2003

- (1) Proposed outline of the conclusions
- (2) Biodiversity research strategies
- (3) Relationship between environment, living organisms and ecosystems
- (4) Research into environmental techniques for using living organisms

6th meeting, January 27, 2004

- (1) Results of research about the state of research into living organisms and ecosystems
- (2) Research into ecosystem management and biodiversity

7th meeting, February 17, 2004

- (1) Ideal living organism and ecosystem R&D
- (2) The R&D scenarios

8th meeting, March 11, 2004

- (1) Draft proposals for compiling the report
- (2) The R&D issues Japan must address in the future
- (3) Related matters of importance

9th meeting, April 5, 2004

- (1) Draft proposals for compiling the report
- (2) Future activities

10th meeting, May 20, 2004

- (1) Draft proposals for compiling the report
 - (2) How the report should be put to use
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Table 7 Roster for the Working Group on Living Organisms and Ecosystems Research and Development

As of July 30, 2003

HIDAKA Toshitaka

Director-general, Research Institute for Humanity and Nature

OKA Mitsunori,

Director, Department of Biological Safety, National Institute for Agro-Environmental Sciences

SUMIDA Seizo

Managing Director, Japan Bioindustry Association

NAKASHIZUKA Tohru (ASANO Toru)

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FUJITA Kouichi

Head, River Environment Division, Environment Department, National Institute for Land and Infrastructure Management, Ministry of Land, Infrastructure and Transport

WASHITANI Izumi

Professor, Graduate School of Agricultural and Life Sciences, The University of Tokyo

WATANABE Makoto

Director, Environmental Biology Division, National Institute for Environmental Studies

(The mark indicates the general manager)
