WORLD METEOROLOGICAL ORGANIZATION

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CBS EXPERT MEETING ON GEOSS MATTERS

ITEM 3

GENEVA, SWITZERLAND, 7-9 NOVEMBER 2005

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GEOSS 10-Year Implementation Plan

Table of Work Plan Targets

(Submitted by the Secretariat)

Summary and Purpose of Document

The document presents the task that GEOSS plans to address on a 2-, 6- and 10-year basis.

ACTION PROPOSED

Review the targets contained in this document and identify those of relevance for CBS with priority put on the timeframe 2005-2008.

GROUP ON EARTH OBSERVATIONS

GEOSS 10-Year Implementation Plan

Table of Work Plan Targets

Document GEO 1000R-T

- List of all 107 Two-Year Targets
- List of all 82 Six-Year Targets
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- Summary Table of Target Counts and Ranges

Target #	Reference Doc. Sec. #	Societal Benefit Area & Target Year	Full Text of Target (as it appears in the GEOSS 10 Year Implementation Plan Reference Document)
001	4.1.4-2.1	DISASTERS 2-Year	Advocate strengthening of the International Charter on Space and Major Disasters and similar support activities to enable better response to and documentation of effects of disasters, such as floods, earthquakes and oil spills. Its scope may be expanded to allow for pre-event tasking where forecasting is adequate to justify the effort (wildland fires, some floods and coastal disasters, volcanic eruptions). An expanded scope may also encompass Earth Observation training and capacity building of local users in affected areas, particularly in developing countries.
002	4.1.4-2.2	DISASTERS 2-Year	Facilitate global access to the 100-metre (C-band) and 30-metre (X-band) horizontal resolution digital terrain information produced during the Shuttle Radar Topography Mission (SRTM).
003	4.1.4-2.3	DISASTERS 2-Year	Advocate expansion of seismic monitoring networks, plus expansion of the present network of ocean-bottom pressure sensors, and upgrade existing global networks (e.g. the GSN) so that all critical instruments relay data in real time, in support of better tsunami warning worldwide.
004	4.1.4-2.4	DISASTERS 2-Year	Facilitate focused pilot studies in under-served hazardous areas, for example Japan's Deployment of Asia-Pacific Hazard-mitigation Network for Earthquakes and volcanoes (DAPHNE).
005	4.1.4-2.5	DISASTERS 2-Year	Facilitate ongoing capacity building, with a focus on transferring technologies and best practices. Also essential are best practices for the dissemination of real-time information and early warnings to end users and the public. Specifically, improvements in real-time flood forecasting for developing countries should be a priority, in concert with efforts by UNESCO and WMO to expand and improve flood-related information systems.
006	4.1.4-2.6	DISASTERS 2-Year	Facilitate effective monitoring from existing geostationary satellites, launched primarily for weather monitoring, for non-weather applications such as volcanic eruptions and volcanic ash clouds, forest fires, aerosols, and other hazards that require a high observation frequency.
007	4.1.4-2.7	DISASTERS 2-Year	Advocate integration of InSAR technology into disaster warning and prediction systems, in particular related to floods, earthquakes, landslides and volcanic eruptions. The ERS (European Remote Sensing) and Envisat missions of the European Space Agency have pioneered these applications and should be continued for global, long-term applications. Also, the Canadian Space Agency's Radarsat-1 mission with its InSAR capability contributed significantly to the development of applications related to geohazard monitoring and research. In this respect, Radarsat-2 should be a data source for geohazard InSAR applications. As part of this effort, efficient exploitation of data from Japan's upcoming Advanced Land Observation Satellite (ALOS) should also be facilitated. Its L-band SAR sensor is the first such sensor since 1998.
008	4.1.4-2.8	DISASTERS 2-Year	Produce an inventory of existing geologic and hazards zonation maps and identify areas and types of hazards where they are most critically lacking, or where maps need to be digitized.
009	4.1.4-2.9	DISASTERS 2-Year	Advocate further development of the Global Spatial Data Infrastructure (GSDI) and draw on GSDI components as institutional and technical precedents.
010	4.1.4-2.10	DISASTERS 2-Year	Produce a comprehensive gaps analysis to assess the status and regional distribution of existing disaster management capacity-building programmes and initiatives.

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011	4.2.4-2.1	HEALTH 2-Year	Advocate new, high-resolution Earth observations relevant to health needs.
012	4.2.4-2.2	HEALTH 2-Year	Facilitate the establishment of exchanges between health care experts in developed countries, developing countries, and indigenous communities to ensure a global perspective of the challenges and some coordinated development of a network to address problems and to leverage Earth Observation systems where appropriate.
013	4.2.4-2.3	HEALTH 2-Year	Facilitate mechanisms that help to translate the needs of health data users into requirements that Earth Observation data providers can address.
014	4.2.4-2.4	HEALTH 2-Year	Promote the development of an integrated public health information network database that includes information relevant to human health officials and agencies, and includes multi-scaled, multi-temporal spatial data collected from remote sensing data sources, to provide better predictive models of the effects of environmental factors affecting human health and well-being.
015	4.2.4-2.5	HEALTH 2-Year	Facilitate development of data products and systems that integrate Earth science databases with health and epidemiological information. This includes social and infrastructure data needed in decision support systems for health care planning and delivery. For example, in places having no water quality data but large populations with a reduced life span, the best way to improve health may be to monitor water quality/drinking water, implement water purification, and inform the public about the need to use purified water.
016	4.2.4-2.6	HEALTH 2-Year	Advocate enhancements to international networks and systems needed to support Earth Observation data sharing in areas of human health.
017	4.2.4-2.7	HEALTH 2-Year	Produce a comprehensive gaps analysis of existing capacity building programmes and aggressively promote initiatives for improved coordination.
018	4.2.4-2.8	HEALTH 2-Year	Advocate, within its field of competence, an increase in collaborative research programmes between developed and developing country scientists and indigenous communities, to their mutual benefit.
019	4.2.4-2.9	HEALTH 2-Year	Facilitate the ability to overlay on epidemiology maps the variety of relevant inventoried and processed data, including meteorological, aerosol, ocean and land features, demographic, and infrastructure. This kind of overlay map will be created through interoperable databases and services provided by existing national and international Spatial Data Infrastructures (SDIs).
020	4.2.4-2.10	HEALTH 2-Year	Facilitate reductions in the lag time in the temporal collection and assimilation of human health data (in some cases, this can mean years) and the “real-time” synoptic data that is collected by remote sensing systems.
021	4.2.4-2.11	HEALTH 2-Year	Facilitate provision of historical remote sensing data that can be used for tracking or monitoring environmental changes as precursors for what exists today and for modelling future human health scenarios.
022	4.2.4-2.12	HEALTH 2-Year	Facilitate identification of technical needs in terms of instrumentation and data products that will yield useful epidemiological data at the community level.

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023	4.2.4-2.13	HEALTH 2-Year	Facilitate identification of "paradigm environments", such as vaccine field sites that have strong epidemiological and demographic data, and demonstrate the utility of overlaying high resolution remotely sensed data as a way to correlate environmental factors and specific infectious diseases (e.g. cholera and malaria).
024	4.2.4-2.14	HEALTH 2-Year	Facilitate development of models relating remotely sensed and *in situ* data to the epidemiology of environmentally related infectious and chronic diseases
025	4.3.4-2.1	ENERGY 2-Year	Facilitate the exchange and use of existing data/products and forecast information through specific initiatives and actions in coordination with the energy community: (i) to raise awareness about the importance and potential of environmental information; (ii) to facilitate access to the existing information and products; and (iii) to develop training and encourage the development of decision-support tools for optimal energy use.
026	4.3.4-2.2	ENERGY 2-Year	Produce, in coordination with the energy community, a strategic 5-10 year plan for exploitation of the benefits of the new generation of operational observing systems - both space-based and in situ - which comes on-stream in this decade. The plan should include efforts on: (i) operationalizing existing research capabilities to meet the needs of the energy industry; (ii) research and development in advanced end-to end modelling and forecasting techniques (such as ensemble-based methods) covering both environmental and energy processes, and with an emphasis on issues of risk assessment; (iii) the improvement of information networks by linking existing systems and making them inter-operable; (iv) continue efforts to raise awareness of, facilitate access to, and operationalize improved methodologies for exploitation of GEOSS data and information products for the industry.
027	4.4.4-2.1	CLIMATE 2-Year	Support GSN and GUAN networks, Global Atmosphere Watch (GAW) observatories, initial Global Ocean Observing System (GOOS), river discharge, lake levels, soil moisture, permafrost, snow cover and glacier observing networks, which are recommended in the GCOS Implementation Plan.
028	4.4.4-2.2	CLIMATE 2-Year	Support implementation of actions called for in GCOS Implementation Plan and the relevant IGOS-P Theme Reports.
029	4.4.4-2.3	CLIMATE 2-Year	Improve the reporting of observations to international data and analysis centres in terms of data volumes, quality and timeliness.
030	4.4.4-2.4	CLIMATE 2-Year	Improve the capability of international data centres for data archiving and distribution of data and products.
031	4.4.4-2.5	CLIMATE 2-Year	Establish a strong collaboration mechanism between observational organizations and research communities, and users of climate information, to further refine the observations, analyses and products required.
032	4.4.4-2.6	CLIMATE 2-Year	Identify the needs and solutions necessary to implement the global observing systems for climate in all regions and countries based on the recommendation of GCOS Implementation Plan and specific regional action plans.

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033	4.4.4-2.7	CLIMATE 2-Year	Initiate an intergovernmental mechanism in the terrestrial domain to prepare and issue regulatory and guidance information on observational procedures and data management as, for example, also asked for in decision 9/CP.9 (UNFCCC, 2003).
034	4.4.4-2.8	CLIMATE 2-Year	Support JCOMM to coordinate the implementation of and prepare regulatory and guidance information for an operational *in situ* ocean observing system.
035	4.4.4-2.9	CLIMATE 2-Year	Emphasize to satellite agencies the importance of satellites for long-term climate monitoring, and advocate that all Earth observing satellite systems adhere to the GCOS Climate Monitoring Principles (WMO, 2003) and commit to the suite of instrumentation called for in the GCOS Implementation Plan and in the relevant IGOS-P Theme Reports.
036	4.4.4-2.10	CLIMATE 2-Year	Focus on research programmes to support the development of observational capabilities for ECVs such as tropospheric ozone, cloud and aerosol properties and their vertical profiles, CO2 and other greenhouse gases, soil moisture and groundwater, above-ground biomass, permafrost, snow cover and glaciers, and ocean salinity, carbon and nutrients and their vertical profiles.
037	4.4.4-2.11	CLIMATE 2-Year	Coordinate climate sectors and broad user groups to clarify and specify requirements for socio-economic benefit areas (disaster prevention, health, energy, water resources, ecosystem, agriculture, and biodiversity) for climate products and information.
038	4.4.4-2.12	CLIMATE 2-Year	Enforce palaeoclimate research to improve knowledge about historical and current climate change, by combining natural science data and socio-economic information.
039	4.4.4-2.13	CLIMATE 2-Year	Promote the improvement of emission databases for aerosols, greenhouse gases and their precursors.
040	4.5.4-2.1	WATER 2-Year	Facilitate, with countries, WMO and UNESCO, improvements in existing *in situ* observation systems through coordination and optimization of existing *in situ* networks at global, regional and national level.
041	4.5.4-2.2	WATER 2-Year	Produce a plan for a network of sophisticated, integrated *in situ* observation sites, to support process studies and algorithm and model development.
042	4.5.4-2.3	WATER 2-Year	Facilitate international data sharing and exchange agreements for water data with countries, WMO, and UNESCO, and monitor and routinely report compliance with the policy.
043	4.5.4-2.4	WATER 2-Year	Produce an implementation plan for a broad global water cycle data integration system that combines *in situ* and satellite and numerical model outputs and disseminates usable information for decision-making.
044	4.5.4-2.5	WATER 2-Year	Facilitate, with space agencies and research communities, more accurate, frequent (3-hourly), global, high spatial resolution, and microphysically detailed measurements of precipitation through a global constellation of satellites carrying passive microwave radiometers in complementary orbits.
045	4.5.4-2.6	WATER 2-Year	Advocate that IGOS-P should take the lead in development of integrated precipitation and soil moisture products and new products including indicators.

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046	4.5.4-2.7	WATER 2-Year	Facilitate, with space agencies and research communities, studies to evaluate the contribution of space-based observations to the determination of surface water quality and mapping of critical aquatic habitats.
047	4.5.4-2.8	WATER 2-Year	Produce an evaluation of the resolution and accuracy requirements for applying satellite altimetry to the measurement of streamflow and surface water storage.
048	4.5.4-2.9	WATER 2-Year	Facilitate establishment of an international coordination function for *in situ* water cycle observation and data integration and dissemination.
049	4.5.4-2.10	WATER 2-Year	Produce a framework for developing ensemble-based hydrological predictions and improve the ability of users to exploit the information.
050	4.5.4-2.11	WATER 2-Year	Advocate and globalize ongoing activities that promote the use of Earth observation for both monitoring the state of, and improving implementation of, water resources management in developing countries, particularly in concert with the activities pursued by the CEOS WSSD Follow-up Programme.
051	4.5.4-2.12	WATER 2-Year	Organise workshops and special studies for documenting the cultural barriers to technology transfer and procedures in order to identify and avoid these obstacles.
052	4.5.4-2.13	WATER 2-Year	Advocate eliminating barriers to the free and open exchange of data and software to enable full access by water managers in developing countries.
053	4.6.4-2.1	WEATHER 2-Year	Facilitate investment in the critical data gaps (atmospheric wind and humidity profiles, ocean evaporation and precipitation, soil moisture, precipitation) and improve predictive models to augment the quality of forecasts of severe events and general weather conditions.
054	4.6.4-2.2	WEATHER 2-Year	Advocate support for plans to assist developing countries to utilize the forecasts in order to reduce impacts on life and property.
055	4.6.4-2.3	WEATHER 2-Year	Facilitate, with WMO, education and training of developing country personnel in the effective use of currently available weather information.
056	4.6.4-2.4	WEATHER 2-Year	Advocate support for existing weather capacity building programmes and initiatives, understanding their status and regional distribution.
057	4.6.4-2.5	WEATHER 2-Year	Advocate support for the WMO plans to establish the feasibility of expanding EUCOS to other regions.
058	4.7.4-2.1	ECOSYSTEMS 2-Year	Facilitate the harmonization of methods for observing the GEOSS set of ecosystem variables.
059	4.7.4-2.2	ECOSYSTEMS 2-Year	Facilitate the full implementation of a global carbon observing system, in accordance with the specifications detailed in the IGOS-P IGCO Theme Report, which incorporates the Terrestrial Carbon Observation plan of GTOS, and carbonrelated components of GOOS and GCOS.

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060	4.7.4-2.3	ECOSYSTEMS 2-Year	Facilitate a globally agreed, robust and implementable (operational) classification scheme for ecosystems.
061	4.7.4-2.4	ECOSYSTEMS 2-Year	Advocate the operational continuity of moderate to high-resolution Earth-observing satellites for land cover and ocean colour.
062	4.7.4-2.5	ECOSYSTEMS 2-Year	Facilitate efforts to eliminate regional disparity in observing capacity. For example, two thirds of the World's oceans are in the Southern Hemisphere, whereas most of the advanced oceanographic centres are in the Northern Hemisphere. Stations for observing ecological variables on land are much more closely spaced in temperate countries than in the tropical belt.
063	4.7.4-2.6	ECOSYSTEMS 2-Year	Facilitate the networking of institutions making observations relating to ecosystems.
064	4.7.4-2.7	ECOSYSTEMS 2-Year	Advocate the development of tools to scale up from a limited number of *in situ* ecosystem observations made at local scales, to arrive at a large-scale, comprehensive picture of ecosystems.
065	4.7.4-2.8	ECOSYSTEMS 2-Year	Advocate the continued rescue, acquisition, digitisation and making accessible of historical information relating to ecosystems.
066	4.7.4-2.9	ECOSYSTEMS 2-Year	Facilitate the validation of existing tools such as synthetic aperture radar and hyperspectral imagers for the measurement of ecosystem properties.
067	4.7.4-2.10	ECOSYSTEMS 2-Year	Advocate the development of new sensors and platforms, and facilitate their use for routine observations in the field on an operational basis. For example, airborne sensor technologies such as LIDAR are ready to move out of the research domain. Molecular tools are now being developed to study the microbial ecology of marine systems. *In situ*, self-contained, flow cytometers for classification of phytoplankton and bacteria (the "cytobuoys") and underwater laser imaging and scanning techniques that can be used for recording marine life underwater and for detecting terrestrial ecosystem structures, are in advanced stages of development. New sensors are also on the horizon for measurement of the chemical properties of the ocean and terrestrial ecosystems.
068	4.8.4-2.1	AGRICULTURE 2-Year	Facilitate - with relevant users at regional, national and local level - definition of user needs for agriculture, rangelands, forestry and fisheries in terms of Earth Observation data and information, as well as mechanisms to keep users informed.
069	4.8.4-2.2	AGRICULTURE 2-Year	Advocate and facilitate existing initiatives that regularly provide updates of land cover data at 1:1,000,000 scale; use agreed ISO standard to initiate land cover mapping activities at 1:500,000.
070	4.8.4-2.3	AGRICULTURE 2-Year	Facilitate regional training in land cover classification and the assimilation of existing data sets in Africa, Asia and Latin America.
071	4.8.4-2.4	AGRICULTURE 2-Year	Facilitate the use of agriculture, forestry, and fishery production statistics to be exploited at pixel level.

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072	4.8.4-2.5	AGRICULTURE 2-Year	Advocate the adoption and use of geostationary satellite data (e.g. Meteosat Second Generation) in food-insecure regions.
073	4.8.4-2.6	AGRICULTURE 2-Year	Facilitate establishment of a basis for the continuity of high resolution optical and radar satellite observing networks (5-30 m).
074	4.8.4-2.7	AGRICULTURE 2-Year	Facilitate production of a map of the World's irrigated agriculture areas, and the establishment of a monitoring programme among users.
075	4.8.4-2.8	AGRICULTURE 2-Year	Advocate the development of on-time monitoring and information systems for significant and extreme events such as fire, forest conversion, and forest concession management.
076	4.8.4-2.9	AGRICULTURE 2-Year	Facilitate the development of courses to demonstrate the usage of Earth observation data and products in developing countries.
077	4.9.4-2.1	BIODIVERSITY 2-Year	Facilitate the interoperability of the multi-institutional biodiversity observation network through GBIF and ensure that it links to data sets of ecological and other related observation systems.
078	4.9.4-2.2	BIODIVERSITY 2-Year	Develop a biodiversity observation strategy that is spatially and topically prioritized, based on analysis of existing information, identifying unique or highly diverse ecosystems and those supporting migratory, endemic or globally threatened species, those whose biodiversity is of socio-economic importance, and which can support the 2010 CBD target.
079	4.9.4-2.3	BIODIVERSITY 2-Year	Facilitate the capture of ten million new biodiversity observations per year, the agreement to data collection protocols by networks of permanent sites, and the launch of initiatives on three key issues.
080	4.9.4-2.4	BIODIVERSITY 2-Year	Advocate additional support to permit data system integration sharing by data providers, particularly the research and collections institutions.
081	4.9.4-2.5	BIODIVERSITY 2-Year	Produce an analysis of the gaps and needs in capacity building initiatives within the biodiversity observation system, including for microbial biodiversity.
082	4.9.4-2.6	BIODIVERSITY 2-Year	Produce a strategy for capturing the outputs of citizen-based biodiversity monitoring systems.
083	4.10.4-2.1	COMMONALITIES 2-Year	Facilitate sharing of best practices for the development of products customized for particular socio-economic benefits.
084	4.10.4-2.2	COMMONALITIES 2-Year	Produce practical strategic and tactical guidance on how to converge disparate systems to a higher degree of collaboration and interoperability using GEOSS principles.
085	4.10.4-2.3	COMMONALITIES 2-Year	Facilitate interoperability among data sets acquired by different countries and agencies, as these are not likely to be in compatible formats or easily usable form.

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086	4.10.4-2.4	COMMONALITIES 2-Year	Facilitate the development of basic geographic framework data.
087	5.8-2.1	ARCHITECTURE 2-Year	Advocate formal commitments of contributions by GEO Members and Participating Organizations, including agreement to adhere to GEOSS interoperability specifications.
088	5.8-2.2	ARCHITECTURE 2-Year	Produce a publicly accessible, network-distributed catalogue maintained collectively under the auspices of GEOSS. The catalogue will include information on GEO Members and Participating Organizations and the components they support. The catalogue system will itself be subject to GEOSS interoperability specifications, including the standard s earch service and geospatial services.
089	5.8-2.3	ARCHITECTURE 2-Year	Establish and maintain a process for reaching interoperability arrangements, informed by ongoing dialogue with major international programmes and consortia. That process is to be sensitive to technology and accessibility disparities among GEO Members and Participating Organizations, and must include mechanisms for upgrading arrangements.
090	5.8-2.4	ARCHITECTURE 2-Year	Advocate use of existing Spatial Data Infrastructure (SDI) components as institutional and technical precedents in areas such as geodetic reference frames, common geographic data, standard protocols, and interoperable system interfaces, among other components.
091	5.8-2.5	ARCHITECTURE 2-Year	Establish and maintain baseline sites for global *in situ* networks.
092	5.8-2.6	ARCHITECTURE 2-Year	Develop a cost-and-benefit-sharing mechanism(s) for observations by which an optimum observation system can be realized.
093	5.8-2.7	ARCHITECTURE 2-Year	Provide a framework for securing the future continuity of necessary observations and initiating new observations.
094	5.8-2.8	ARCHITECTURE 2-Year	Facilitate the analysis of the current and planned systems for data transfer and dissemination by GEOSS members.
095	5.8-2.9	ARCHITECTURE 2-Year	Facilitate a common understanding of future capabilities at a global level for data dissemination.
096	6.6-2.1	DATA & USERS 2-Year	Establish a mechanism for coordinating user needs within the various societal benefit areas.
097	6.6-2.2	DATA & USERS 2-Year	Facilitate, with relevant countries and international organizations, the development and availability of data, metadata, and products commonly required across diverse societal benefit areas, including base maps and common socio-economic data.
098	6.6-2.3	DATA & USERS 2-Year	Advocate, through appropriate representations to the International Telecommunication Union, the protection of radio frequencies critical to Earth observation.

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099	7.5-2.1	CAPACITY BUILDING 2-Year	Produce a comprehensive review and gaps analysis based on existing regional and international capacity building efforts as a first step in the implementation of GEOSS. GEO will facilitate coordination of those efforts with the objective of achieving the maximum return for the effort expended.
100	7.5-2.2	CAPACITY BUILDING 2-Year	Produce methodologies to monitor and evaluate capacity building initiatives relating to Earth Observation systems.
101	7.5-2.3	CAPACITY BUILDING 2-Year	Facilitate, with existing international, regional and national efforts, the maintenance and strengthening of education, training, research, and communication so that each country reaches and sustains a level of capability that enables them to participate in GEOSS, receiving maximum benefits from it according to their needs.
102	7.5-2.4	CAPACITY BUILDING 2-Year	Facilitate, with developing countries and across all societal benefit areas, the establishment and maintenance of baseline sites for global *in situ* and remotesensing networks that cannot always be justified on national grounds alone, in cooperation with relevant global research programs and activities to ensure that synergies in observations and understanding are achieved. Examples include the inadequacy of GCOS, GTOS, GOOS, and Global Geodetic Observing System (GGOS) sites in developing countries and the need to establish a minimum set of oceanic, terrestrial and atmospheric reference stations for long-term observations of key variables.
103	7.5-2.5	CAPACITY BUILDING 2-Year	Develop a network of experts involved in existing local, national and global capacity building initiatives related to Earth Observation to facilitate the task of furthering capacity building, and inform the GEO Members and Participating Organizations of existing efforts in capacity building. GEO will encourage users to access this knowledge base.
104	7.5-2.6	CAPACITY BUILDING 2-Year	Encourage, in each societal benefit area, the development of capacity building components as a requirement to any network, project, activity, or user forum that will be a component of GEOSS.
105	7.5-2.7	CAPACITY BUILDING 2-Year	Facilitate access to data and models, particularly for developing countries.
106	7.5-2.8	CAPACITY BUILDING 2-Year	Develop recommended priorities for new or augmented efforts in capacity building, to meet the objectives of the overall GEOSS 10-Year Implementation Plan.
107	8.4.1-2.1	OUTREACH 2-Year	GEO will produce and begin to implement an outreach plan directed toward key target audiences, including decision-makers and policy makers; educators and trainers; the general public; industry and service communities; scientific and technical communities; non-governmental organizations; public interest advocacy groups; and international financial institutions and official development assistance agencies.

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108	4.1.4-6.1	DISASTERS 6-Year	Facilitate widespread use of LiDAR and InSAR technologies for topography in areas of low relief. For floods and coastal hazards, the most crucial need is for high vertical resolution (less than 1 metre) topographic data, plus good shallow-water bathymetry.
109	4.1.4-6.2	DISASTERS 6-Year	Advocate continuity and interoperability of all satellite systems providing global positioning, such as the United States Global Positioning System (GPS), European GALILEO, Russian Global Orbiting Navigation Satellite System (GLONASS) and Japanese Quasi-Zenith Satellite System (QZSS). This includes support of the global geodetic network services such as Very Long Baseline Interferometry (VLBI) and Satellite Laser Ranging (SLR), that define the orbits of the GPS satellites and thereby enable the use of GPS for precise geo-location. Applications of GPS essential to disaster response include precision topography, mapping support, and deformation monitoring, as well as geo-location for search and rescue operations.
110	4.1.4-6.3	DISASTERS 6-Year	Advocate that the international satellite community, coordinated through the Committee on Earth Observation Satellites (CEOS), plan for assured continuity of critical sensing capabilities. For example, certain research systems should become operational systems and the projected lifetimes of some systems should not result in service gaps of key satellite sensor data. Longer-term actions for monitoring of geohazards include realization of an integrated observation system of SAR interferometry and GPS.
111	4.1.4-6.4	DISASTERS 6-Year	Advocate enhancements of the automatic processing and evaluation of satellite imagery, to facilitate production of digital topography, and to support rapid detection of fires, oil spills, or other hazards.
113	4.1.4-6.5	DISASTERS 6-Year	Advocate more rapid SAR processing for interferometry to enable strain mapping over large seismically active zones and to monitor landslides and subsidence in populated areas and along transportation corridors.
114	4.1.4-6.6	DISASTERS 6-Year	Advocate systematic expansion of the inventory of geologic and hazards zonation maps and expansion of Geographic Information Systems (GIS) as a critical tool for managing spatial information for disaster management. In this context, digital maps based on distributed systems and data sources and conforming to recognized international GIS standards (e.g. International Organization for Standardization standards and Open Geospatial Consortium specifications).
115	4.1.4-6.7	DISASTERS 6-Year	Facilitate the development and sharing of critical airborne sensors and capabilities, such as hyper-spectral sensors, high-resolution infrared sensors and LiDAR.
116	4.1.4-6.8	DISASTERS 6-Year	Advocate the development of models to better support disaster response. One area of particular interest is the dispersion of pollution plumes in the atmosphere or in water (including the spread of oil spills in the marine environment).
117	4.1.4-6.9	DISASTERS 6-Year	Establish a process for monitoring of capacity-building efforts in disaster management to enable building upon strong existing programmes in the continuing efforts to integrate and share resources.
118	4.1.4-6.10	DISASTERS 6-Year	Advocate access to data from seismic and infrasound networks operated by the Preparatory Commission for the Comprehensive Nuclear Test-Ban Treaty Organization (CTBTO) that are useful and relevant for monitoring earthquakes and volcanic activity.'
119	4.1.4-6.11	DISASTERS 6-Year	Facilitate access to real-time data analyzing technology and real-time access to critical data for all hazards.

Target #	Reference Doc. Sec. #	Societal Benefit Area & Target Year	Full Text of Target (as it appears in the GEOSS 10 Year Implementation Plan Reference Document)
120	4.1.4-6.12	DISASTERS 6-Year	Advocate real-time monitoring of submarine seismic and volcanic activities and tsunami propagation.
121	4.2.4-6.1	HEALTH 6-Year	Produce an inventory of available Earth remote sensing and ground-based databasesthat can be associated with known health problems such as asthma, pollutant exposure, birth defects, seafood contamination and certain infectious and vector-borne diseases. This includes remote sensing and ground-based databases, historic data sets encompassing well characterized epidemics, and gaps in human health related environmental data (e.g. places where water, soil, or air quality are not measured.) To accomplish this, GEOSS will develop the tools, architecture and infrastructure for a public health information network data base that can be accessed and used by the public health community at large to obtain historical and current health data for better predictability of environmental effects on human health.
122	4.2.4-6.2	HEALTH 6-Year	Facilitate further development of remotely sensed maps describing the global system for sources, transport and sinks/deposition of gasses and aerosols, and systems characterizing atmospheric, soil, river and coastal pollution.
123	4.2.4-6.3	HEALTH 6-Year	Facilitate human health community input to the technical specification of new major environmental observation capabilities, including *in situ* and remotely sensed observations.
124	4.2.4-6.4	HEALTH 6-Year	Facilitate the development of sets of environment and infrastructural determinants of health, e.g. sanitation, transport, energy, communications, traffic management systems, and housing.
125	4.2.4-6.5	HEALTH 6-Year	Facilitate the development of the tools and processes needed to address health concerns and develop a useful regional network of experts and information databases, working primarily through the GEOSS coordination group for health described above.
126	4.2.4-6.6	HEALTH 6-Year	Facilitate the establishment of a coordinating group focused on health organizations as users of Earth Observation data and information. This outreach and information sharing group must engage developed and developing country health communities to ensure a global perspective of the challenges and to catalyze a global network to address problems.
127	4.2.4-6.7	HEALTH 6-Year	Advocate the development of indicators of human health based on environmental measurements.
128	4.2.4-6.8	HEALTH 6-Year	Facilitate the development of monitoring methods and systems to detect early evidence of health-related changes and to further inform epidemiological modeling studies.
129	4.2.4-6.9	HEALTH 6-Year	Facilitate coordinated approaches to the integration of environmental monitoring parameters with vectors, animal reservoirs of disease, and clinical admissions.
130	4.2.4-6.10	HEALTH 6-Year	Facilitate the development of mechanisms for alerting public health professionals to hazardous conditions identified by environmental monitoring.
131	4.2.4-6.11	HEALTH 6-Year	Facilitate the availability of wide-area health parameters derived from satellite data, e.g. sanitation, transport, energy, communications, traffic management systems, and housing.

Target #	Reference Doc. Sec. #	Societal Benefit Area & Target Year	Full Text of Target (as it appears in the GEOSS 10 Year Implementation Plan Reference Document)
132	4.2.4-6.12	HEALTH 6-Year	Facilitate the development of geochemical baseline data and maps, such as trace element toxicity and deficiencies.
131	4.3.4-6.1	ENERGY 6-Year	Produce an evaluation of the Plan's progress with regard to energy and revise strategy as needed. The revised Plan will also include an assessment of the needs of the energy sector for new and/or enhanced GEOSS observations and products.
132	4.3.4-6.2	ENERGY 6-Year	Facilitate the exchange of data and products for efficient energy management.
133	4.3.4-6.3	ENERGY 6-Year	Facilitate the use of improved weather and climate products for the development of new energy tailored products and services.
134	4.4.4-6.1	CLIMATE 6-Year	Enhance the collaboration mechanism between observation organizations and research communities with users of climate information to make maximum use of the observations, analyses and products.
135	4.4.4-6.2	CLIMATE 6-Year	Support implementation of actions called for in the GCOS Implementation Plan and the relevant IGOS-P Theme Reports.
136	4.4.4-6.3	CLIMATE 6-Year	Promote the establishment of data archive centres for all ECVs.
137	4.4.4-6.4	CLIMATE 6-Year	Promote institutional commitments to provide integrated global analyses of all ECVs.
138	4.4.4-6.5	CLIMATE 6-Year	Develop data integration facilities for exchanging data, products and information between climate sectors and socio-economic benefit areas.
139	4.4.4-6.6	CLIMATE 6-Year	Emphasize detection of current and historical climate changes and their impacts linked with other societal benefit areas such as disaster, health, water, ecosystem and agriculture by combining the natural scientific data and socio-economic information and enforcing paleoclimate research approaches.
140	4.4.4-6.7	CLIMATE 6-Year	Develop and operate new *in situ* and/or space-based observation instruments for the observation of ECV such as cloud and aerosol properties and their vertical profiles, ocean salinity, ocean carbon and nutrients, soil moisture and ground water, CO2 and other greenhouse gasses.
141	4.4.4-6.8	CLIMATE 6-Year	Produce a number of new products for precipitation, soil moisture, evaporation, evapotranspiration and other water cycle variables, by *in situ* observations and the planned space missions.
142	4.4.4-6.9	CLIMATE 6-Year	Provide validation of the accuracy of new water cycle data products, involving "virtual water" with respect to food production and its transportation.
143	4.4.4-6.10	CLIMATE 6-Year	Advocate continuous sensor development with improvement of accuracy and higher spatial-temporal resolutions, and with special attention to snow water equivalent and streamflow.

Target #	Reference Doc. Sec. #	Societal Benefit Area & Target Year	Full Text of Target (as it appears in the GEOSS 10 Year Implementation Plan Reference Document)
144	4.4.4-6.11	CLIMATE 6-Year	Facilitate international and fully networked operational data exchange capabilities.
145	4.4.4-6.12	CLIMATE 6-Year	Facilitate testing of a fully integrated prototype data system, with data assimilation, analysis and visualization capabilities for the water cycle.
146	4.4.4-6.13	CLIMATE 6-Year	Advocate a study of the water resource variables required to support an expert system in water management and provide prototyping on an operational system for assimilating routine water cycle observations for improved monitoring and management of water resources.
147	4.4.4-6.14	CLIMATE 6-Year	Advocate a system for the routine collection of water level data for use in validating satellite data and for monitoring surface water storage.
148	4.4.4-6.15	CLIMATE 6-Year	Advocate precision gravity field missions for global water storage monitoring.
149	4.4.4-6.16	CLIMATE 6-Year	Produce a plan for institutionalizing surface water and energy flux measurements.
150	4.4.4-6.17	CLIMATE 6-Year	Facilitate the establishment of coordinated *in situ* observation networks with high (and low) elevation sites along mountain transects.
151	4.5.4-6.1	WATER 6-Year	Produce an experiment using the global network of sophistically and temporally integrated *in situ* observation sites for water cycle observations.
152	4.5.4-6.2	WATER 6-Year	Produce integrated water cycle data sets (including predictions) on a continental scale, such as the Asian monsoon region or any large river watershed.
153	4.5.4-6.3	WATER 6-Year	Produce an evaluation of the data and product requirements for use in applications to water-related health issues with a view to developing a specialized observing system in support of health.
154	4.5.4-6.4	WATER 6-Year	Produce a plan for monitoring drinking water quality, along with efforts to extend water and sanitation services, especially in developing countries.
155	4.5.4-6.5	WATER 6-Year	Facilitate, with space agencies and research communities, the development of effective sensors and missions for precipitation (GPM), surface and subsurface water stores – including snow water equivalence, water stored in natural and manmade reservoirs, and groundwater.
156	4.5.4-6.6	WATER 6-Year	Facilitate, with numerical weather prediction agencies, space agencies and international research programmes, the reanalysis of products for use in determining trends in water cycle variables.
157	4.5.4-6.7	WATER 6-Year	Produce a plan for capacity building to support water management, including hardware and software for receiving and processing satellite and appropriate *in situ* data, and training modules for the developing countries.

Target #	Reference Doc. Sec. #	Societal Benefit Area & Target Year	Full Text of Target (as it appears in the GEOSS 10 Year Implementation Plan Reference Document)
158	4.6.4-6.1	WEATHER 6-Year	Advocate support for WMO coordinated activities to improve data observations and models to produce reliable forecasts of severe weather. These are forecasts that include reliability/probability estimates, as well as a range of possible outcomes, and interact with local authorities to improve usage and provide tailored services through newly established regional and local warning centres.
159	4.6.4-6.2	WEATHER 6-Year	Advocate support for WMO plans in developing countries to support the establishment of new regional centres, to allow reliable warnings of impending severe events.
160	4.6.4-6.3	WEATHER 6-Year	Advocate support for WMO plans to establish better coordinated regional *in situ* observation networks on the basis of the EUCOS model.
161	4.7.4-6.1	ECOSYSTEMS 6-Year	Facilitate the execution of a global (terrestrial, inland water, coastal, and oceanic) ecosystem mapping initiative at a resolution of 500 m, using a standardized classification and the tools validated above, and integrated with the Global Spatial Data Initiative.
162	4.7.4-6.2	ECOSYSTEMS 6-Year	Facilitate the implementation of a global nitrogen observing system.
163	4.7.4-6.3	ECOSYSTEMS 6-Year	Facilitate the coordination and expansion of a network of land, ocean and coastal reference stations for monitoring ecosystem properties such as carbon, nitrogen, phosphorus, and iron fluxes, including change detection.
164	4.7.4-6.4	ECOSYSTEMS 6-Year	Facilitate the establishment of a global, sufficient and representative *in situ* and airborne network for validating and enhancing space-based observations of ecosystem properties in both terrestrial and aquatic ecosystems, based on existing national and regional integrated environmental monitoring networks, and coordinated with and linked to the network described above.
165	4.7.4-6.5	ECOSYSTEMS 6-Year	Produce or facilitate the production of baseline maps for the globe, with adequate resolution and known uncertainty, of selected ecosystem properties such as: leaf area phenology, phytoplankton bloom dynamics; primary production, and net carbon exchange; energy and water exchange; productivity at higher trophic levels (e.g. grazing, fisheries production), and ancillary data such as topography, land use, geology and soils.
166	4.8.4-6.1	AGRICULTURE 6-Year	Advocate the development and improvement of the analytical tools and methods for agriculture risk assessment, and establish common standards and formats.
167	4.8.4-6.2	AGRICULTURE 6-Year	Advocate support for the completion of the World soil and terrain database (SoTer) at a resolution of 1:1 million.
168	4.8.4-6.3	AGRICULTURE 6-Year	Advocate support for the completion of land degradation and desertification assessment in drylands (LADA).
169	4.8.4-6.4	AGRICULTURE 6-Year	Facilitate provision of regularly validated global land cover product at 1:500,000.

Target #	Reference Doc. Sec. #	Societal Benefit Area & Target Year	Full Text of Target (as it appears in the GEOSS 10 Year Implementation Plan Reference Document)
170	4.8.4-6.5	AGRICULTURE 6-Year	Facilitate the role of satellite data in monitoring and maintaining a global farming systems database.
171	4.8.4-6.6	AGRICULTURE 6-Year	Facilitate the establishment of operational linkage of Earth Observation data to geospatially referenced production and use statistics. This should cover crop agriculture, livestock, forestry and freshwater fisheries.
172	4.8.4-6.7	AGRICULTURE 6-Year	Facilitate the continuity of high-resolution imagery for monitoring logging concessions in areas with high biodiversity concentrations.
173	4.8.4-6.8	AGRICULTURE 6-Year	Advocate operational on-time monitoring and information systems introduced for significant and extreme events such as crop yield and crop water stress.
174	4.9.4-6.1	BIODIVERSITY 6-Year	Produce timely data and information for local, national, regional and international policy makers, scientists and natural resource managers through the distributed observation network.
175	4.9.4-6.2	BIODIVERSITY 6-Year	Facilitate the establishment of monitoring systems for policy-interest and endangered species, allowing frequently-repeated globally-coordinated assessment of trends and distributions of species of special conservation merit, including domesticated animals, cultivated plants, and fish species and their wild relatives and species of medicinal or economic value.
176	4.9.4-6.3	BIODIVERSITY 6-Year	Facilitate the operational deployment of a system to provide near-real-time data on detection, establishment and spread of problematic invasive organisms.
177	4.9.4-6.4	BIODIVERSITY 6-Year	Facilitate the systematic monitoring of biodiversity in all ecosystems using statistically valid methods.
178	4.9.4-6.5	BIODIVERSITY 6-Year	Facilitate the full operationality and integration of citizen-based biodiversity observation systems.
179	4.9.4-6.6	BIODIVERSITY 6-Year	Facilitate the addition of twelve million new spatially and temporally explicit observation records yearly.
180	4.9.4-6.7	BIODIVERSITY 6-Year	Facilitate the delivery of capacity building programmes on data use and interpretation.
181	4.10.4-6.1	COMMONALITIES 6-Year	Facilitate the joint evaluation of prototypes that connect multiple systems, and support making operational any research demonstrations of such collaboration and interoperability.
182	4.10.4-6.1	COMMONALITIES 6-Year	Facilitate periodic demonstrations of the overall progress toward the highest level of collaboration and interoperability achieved, as a measure of realizing the full vision of a global system of systems for Earth observations.
183	6.6-6.1	DATA & USERS 6-Year	Facilitate data management approaches that encompass a broad perspective of the observation data life cycle, from input through data acquisition, processing, archiving, and dissemination, including analysis and visualization of large volumes and diverse types of data.

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184	6.6-6.2	DATA & USERS 6-Year	Advocate and facilitate international information sharing capabilities through appropriate technologies, including, but not limited to, Internet-based services.
185	7.5-6.1	CAPACITY BUILDING 6-Year	Advocate funding of multinational projects to leverage the end-to-end value of observations including the establishment of necessary infrastructure.
186	7.5-6.2	CAPACITY BUILDING 6-Year	Produce monitoring and evaluation mechanisms aimed at determining the efficacy of GEO capacity building efforts.
187	7.5-6.3	CAPACITY BUILDING 6-Year	Facilitate education and training to provide a global base of technical expertise for GEOSS.
188	7.5-6.4	CAPACITY BUILDING 6-Year	Develop recommended priorities for new or augmented efforts in capacity building,\ to meet the objectives of the GEOSS 10-Year Implementation Plan.
189	8.4.1-6.1	OUTREACH 6-Year	All target audiences should be reached, although with different priority levels and resources. Decision-makers, educators and trainers, and the general public will remain of highest priority. In the longer term, priority will be given to private sector needs for triple bottom line reporting.
190	4.1.4-10.1	DISASTERS 10-Year	Facilitate further expansion of real-time monitoring of submarine seismic and volcanic activity and of tsunami propagation by use of surface and subsurface sensors, including re-use of submarine telephone cables.
191	4.1.4-10.2	DISASTERS 10-Year	Facilitate further expansion and integration of regional projects like DAPHNE 6 and Global Monitoring for Environment and Security (GMES),7 and the development of efficient interfaces between these and other such programmes.
192	4.1.4-10.3	DISASTERS 10-Year	Advocate meeting various unmet needs for classes of satellite sensors. Of particular importance for the area of hazards and disasters is the global need for a significant increase in SAR satellites (C-band, L-band, and X-band). The disaster management community needs an L-band system optimized for interferometry, and an expanded L-band capacity for better forest and fuel characterization. Monitoring the range of smoke and pollution plumes in the atmosphere around the globe requires expanded hyper-spectral capability, which is currently limited to airborne sensors. A passive microwave capability would help in determining soil moisture repeatedly over broad areas.
193	4.1.4-10.4	DISASTERS 10-Year	Advocate development of systematic methods for rapid determination of shallow bathymetry, especially in turbid water. Such research is vital to characterizing nearshore bathymetry, whether for improved modelling of tsunamis and storm surges or for documenting changes produced during such events.
194	4.1.4-10.5	DISASTERS 10-Year	Produce an evaluation of the effectiveness of its capacity-building activities for the disaster management sector, including an assessment of the effectiveness of building the needed inventory of geologic and hazards zonation maps.

Target #	Reference Doc. Sec. #	Societal Benefit Area & Target Year	Full Text of Target (as it appears in the GEOSS 10 Year Implementation Plan Reference Document)
195	4.2.4-10.1	HEALTH 10-Year	Facilitate access and usability of data needed to assess health vulnerabilities of human populations and support decisions at the local, regional and global scales.
196	4.2.4-10.2	HEALTH 10-Year	Facilitate the early detection and control of environmental risks to human health through improvements in the sharing and integration of Earth observations, monitoring, and early warning systems, databases, models and communications systems.
197	4.2.4-10.3	HEALTH 10-Year	Advocate the formation of a global community of operational and academic researchers who use remote sensing data in a standard format to characterize epidemiological associations with disease.
198	4.2.4-10.4	HEALTH 10-Year	Advocate better on-ground disease surveillance, linked with open national reporting practices, for better understanding and documentation of environmental influences on infectious, chronic and other diseases and disorders.
199	4.2.4-10.5	HEALTH 10-Year	Facilitate improved methods to fill in gaps from *in situ* to remote sensors. For example, improved methods may be appropriate to integrate data from *in situ* water and soil quality monitoring at specific points with remotely sensed water and soil characterizations of whole watersheds.
200	4.2.4-10.6	HEALTH 10-Year	Advocate community-based research that involves the collaboration of people living or working in a community with scientists to design and execute research projects to solve community environmental health problems.
201	4.2.4-10.7	HEALTH 10-Year	Facilitate sharing of environmental monitoring data and collection methods. This may stimulate greater environmental protection and improved health at all levels and in all settings.
202	4.3.4-10.1	ENERGY 10-Year	Facilitate the implementation of appropriate *operational* observing systems – space-based and *in situ* - for the continuous and sustainable provision of reliable and timely data in support of energy operations.
203	4.3.4-10.2	ENERGY 10-Year	Advocate the development of new generation (higher resolution, additional variables…) weather and climate forecasting models.
204	4.3.4-10.3	ENERGY 10-Year	Facilitate capacity building in order to bring energy management at the local level to equivalent high (national and regional) levels of efficiency.
205	4.3.4-10.4	ENERGY 10-Year	Facilitate the development of renewable energy systems taking advantage of products available through GEOSS.
206	4.4.4-10.1	CLIMATE 10-Year	Provide support to the development of a long-term strategy, which encompasses progress in observation, data assimilation and modelling.
207	4.4.4-10.2	CLIMATE 10-Year	Support implementation of actions called for in the GCOS Implementation Plan and the relevant IGOS-P Theme Reports.
208	4.4.4-10.3	CLIMATE 10-Year	Promote new and extended re-analysis programmes for the oceanic, terrestrial and atmospheric domains.

Target #	Reference Doc. Sec. #	Societal Benefit Area & Target Year	Full Text of Target (as it appears in the GEOSS 10 Year Implementation Plan Reference Document)
209	4.4.4-10.4	CLIMATE 10-Year	Contribute to major advances in the monitoring and predictability of climate on seasonal, interannual and decadal time scales, including the occurrence of extreme events.
210	4.4.4-10.5	CLIMATE 10-Year	Establish an evaluation mechanism for climate product applicability to socioeconomic benefits.
211	4.4.4-10.6	CLIMATE 10-Year	Support climate sectors to implement tailored approaches to respond to socioeconomic requirements .
212	4.4.4-10.7	CLIMATE 10-Year	Promote implementation of an integrated observing system for atmospheric composition monitoring in support of climate policy through an optimal combination of ground-based networks, low Earth orbit and geostationary satellites and models.
213	4.5.4-10.1	WATER 10-Year	Produce a characterization of the long-term water cycle budget based on a hierarchy of spatial and temporal scales.
214	4.5.4-10.2	WATER 10-Year	Facilitate, with countries and research communities, operationalization of the global network of sophisticated and temporally integrated *in situ* observation sites.
215	4.5.4-10.3	WATER 10-Year	Produce operational, fully integrated data systems by evaluating and improving prototype systems.
216	4.5.4-10.4	WATER 10-Year	Facilitate provision of data and information, including quantity and quality for both surface and groundwater, to a prototype water cycle expert decision support system.
217	4.5.4-10.5	WATER 10-Year	Facilitate improved simulation and prediction capabilities for precipitation, water cycling and water cycle acceleration in weather and climate models.
218	4.5.4-10.6	WATER 10-Year	Produce a system for monitoring changes in the water cycle, including clouds and precipitation, by using the integrated data system.
219	4.5.4-10.7	WATER 10-Year	Produce integrated information for documentation and understanding of the relationship between known climate indices, particularly ENSO, AO, PDO and MJO, and flood and drought frequency and precipitation type and intensity.
220	4.5.4-10.8	WATER 10-Year	Produce appropriate indicators of “watershed health” routinely from satellite data, surface and subsurface data, and data assimilation capabilities.
221	4.5.4-10.9	WATER 10-Year	Facilitate development of plans for more effective transfer into operations of technologies that have been proven in the research environment.
222	4.5.4-10.10	WATER 10-Year	Facilitate the development of a plan for building the technological capacity of developing countries based on both operational and experimental satellites, and advanced data assimilation capabilities.
223	4.6.4-10.1	WEATHER 10-Year	Facilitate continuous education, evaluation and improvements in developing countries, especially to allow sustained operations of the newly established regional centres.

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224	4.6.4-10.2	WEATHER 10-Year	Advocate and facilitate the establishment of new observing systems to cover specific observations set out in this Reference Document.
225	4.7.4-10.1	ECOSYSTEMS 10-Year	Facilitate the production of spatially-resolved information on ecosystem change, condition and trend, in relation to their capacity to deliver sustainable ecosystem services in sufficient quantities to meet societal needs; i.e. maps of ecosystem health, risk and vulnerability with sufficient resolution to support national and global decision-making.
226	4.7.4-10.2	ECOSYSTEMS 10-Year	Facilitate monitoring of urban ecosystems.
227	4.8.4-10.1	AGRICULTURE 10-Year	Facilitate, with identified partners, the development of a fully integrated *in situ* and spaced-based observation service for on-time drought early warning systems in food-insecure regions.
228	4.8.4-10.2	AGRICULTURE 10-Year	Facilitate, with identified partners, the production of a comprehensive and validated global products suite production capability for land cover in higher resolution (e.g. 1:250,000) and land use in moderate resolution (e.g. 1:500,000).
229	4.8.4-10.3	AGRICULTURE 10-Year	Facilitate the creation of global databases and assessments of irrigated land, water availability for agriculture, land degradation, forest conversion, and aquaculture expansion. Define process for data supply for updates.
230	4.8.4-10.4	AGRICULTURE 10-Year	Facilitate conversion of all statistics and associated sub-national socio-economic data and environmental information to pixel format with known accuracies for cross linkage with satellite data.
231	4.8.4-10.5	AGRICULTURE 10-Year	Facilitate on-time monitoring and information systems for significant and extreme events such as areas of land degradation and desertification.
232	4.8.4-10.6	AGRICULTURE 10-Year	Produce an assessment of the effectiveness of delivery of GEOSS capacity building activities in the agriculture, forestry, and fishery sectors.
233	4.9.4-10.1	BIODIVERSITY 10-Year	Ensure the integration of the distributed biodiversity observation network with sectoral, crisis, health and policy systems. Ensure that it is routinely used to solve problems, guide policy and management and generate opportunities for sustainable development.
234	4.9.4-10.2	BIODIVERSITY 10-Year	Facilitate the addition of fifteen million new spatially and temporally explicit observation records yearly, and the wide accessibility of systems to analyze and model trends in abundance and distribution.
235	4.9.4-10.3	BIODIVERSITY 10-Year	Ensure the optimization of the observational network, including where necessary facilitating the development of new sites, facilities, technologies and networks, based on an analysis of the observations collected in the first decade.
236	4.10.4-10.1	COMMONALITIES 10-Year	Advocate optimum use of data and information available from GEOSS.
237	4.10.4-10.2	COMMONALITIES 10-Year	Develop a plan to sustain and evolve a system of systems beyond 10 years.

Target #	Reference Doc. Sec. #	Societal Benefit Area & Target Year	Full Text of Target (as it appears in the GEOSS 10 Year Implementation Plan Reference Document)
238	6.6-10.1	DATA & USERS 10-Year	Facilitate sharing of data and products among the societal benefit areas and their use for decision making support.
239	6.6-10.2	DATA & USERS 10-Year	Advocate new and increased efforts to enhance data availability and usability beyond the 10 year implementation period.
240	7.5-10.1	CAPACITY BUILDING 10-Year	Within 10 years, GEO will seek to have in place a sustained capacity building strategy that will have significantly strengthened the capability of all countries, and particularly of developing countries, to: • Use Earth Observation data and products (e.g. process, integrate, model) following accepted standards. • Contribute to, access, and retrieve data from global data systems and networks. • Analyze and interpret data to enable development of decision-support tools. • Integrate Earth Observation data and products with other data and products, for a more complete view and understanding of problems and derived solutions. • Improve infrastructure development in areas of poor observational coverage. Develop recommended priorities for new or augmented efforts in capacity building.
241	8.4.1-10.1	OUTREACH 10-Year	All target audiences should be reached, although with different priority levels and resources. Decision-makers, educators and trainers, and the general public will remain of highest priority. In the longer term, priority will be given to private sector needs for triple bottom line reporting.

Summary Table of Target Counts and Ranges

By Section

Section No. and Name	2 Year Targets		6 Year Targets		10 Year Targets		Total #
	Count	Serial # Range	Count	Serial # Range	Count	Serial # Range	
4.1.4 DISASTERS	10	001-010	13	108-120	5	190-194	28
4.2.4 HEALTH	14	011-024	10	121-130	7	195-201	31
4.3.4 ENERGY	2	025-026	3	131-133	4	202-205	9
4.4.4 CLIMATE	13	027-039	17	134-150	7	206-212	37
4.5.4 WATER	13	040-052	7	151-157	10	213-222	30
4.6.4 WEATHER	5	053-057	3	158-160	2	223-224	10
4.7.4 ECOSYSTEMS	10	058-067	5	161-165	2	225-226	17
4.8.4 AGRICULTURE	9	068-076	8	166-173	6	227-232	23
4.9.4 BIODIVERSITY	6	077-082	7	174-180	3	233-235	16
4.10.4 COMMONALITIES	4	083-086	2	181-182	2	236-237	8
5.8 ARCHITECTURE	9	087-095	0	-	0	-	9
6.6 DATA & USERS	3	096-098	2	183-184	2	238-239	7
7.5 CAPACITY BUILDING	8	099-106	4	185-188	1	240	13
8.4.1 OUTREACH	1	107	1	189	1	241	3
Total Count/Range:	**107**	**001-107**	**82**	**108-189**	**52**	**190-241**	**241**