Evaluation of the Implementation of the Asia-Pacific Plan of Action on Space Applications for Sustainable Development (2018-2030) in its Phase I (2018-2022)

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Prepared by

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Tadashi NAKASU, Ph.D.

List of acronyms

ADPC	Asian Disaster Preparedness Center
AI	Artificial Intelligence
AIP	Actionable Intelligence Policy
AOGEO	The Asia-Oceania Group on Earth Observations
APDRN	Asia-Pacific Disaster Resilience Network
APEF	Asian and Pacific Energy Forum
API	Application Programming Interface
AP-IS	Asia-Pacific Information Superhighway
APRSAF	Asia-Pacific Regional Space Agency Forum
APSCO	Asia-Pacific Space Cooperation Organization
ARTSA	ASEAN Research Training Center for Space Technology and Applications
ASEAN	Association of Southeast Asian Nations
ASMC	ASEAN Specialized Meteorological Centre
CADIS	Central Asia Drought Information System
CASA	Cooperation on the Analysis of Carbon Satellites Data
CDDR	Disaster Data Response Mechanism
CHIRPS	Climate Hazards Group InfraRed Precipitation with Station data
CD	Carbon Dioxide
COPUOS	United Nations Committee on the Peaceful Uses of Outer Space
COVID-19	Coronavirus disease of 2019
CSSTEAP	Centre for Space Science and Technology Education in the Asia and Pacific
DRR	Disaster Risk Reduction
EO	Earth Observation
ESA	The European Space Agency
ESCAP	Economic and Social Commission for Asia and the Pacific
EWS	Early Warning Service
FAO	Food and Agriculture Organization
FASSSTER	Spatio-Temporal Epidemiological Modeler
FRDP	The Framework for Resilient Development in the Pacific
GEMMA	GIS-Enabled Mapping Modelling and Analysis – Singapore
GEMS	Geostationary Environment Monitoring Spectrometer
GEO	Group on Earth Observations
GEOGLAM	Group on Earth Observations Global Agricultural Monitoring Initiative
GEOSS	Global Earth Observation Systems of Systems
GEP	Global Electrification Platform
GGRF	Global Geodetic Reference Frame
GIS	Geographic Information Systems
GISTDA	Geo-Informatics and Space Technology Development Agency
GNSS	Global Navigation Satellite System
GPM	Global Precipitation Measurement
GPS	Global Positioning System
ICG	International Committee on GNSS

ICT	Information and Communications Technology
IDA	Initial Damage Assessment
IGIF	United Nations Integrated Geospatial Information Framework
IGMASS	International Global Aerospace System
ISRO	Indian Space Research Organization
JAXA	Japan Aerospace Exploration Agency
MGA	Multi-GNSS Asia
MODIS	Moderate Resolution Imaging Spectroradiometer
NAP-DRR	National Strategic Action Plan for Disaster Risk Reduction
NASA	National Aeronautics and Space Administration
NRM	Natural Resource Management
NSDI	National Spatial Data Infrastructure
ODC	Open Data Cube
OECD	Organization for Economic Cooperation and Development
OSM	OpenStreetMap
QZSS	Quasi-Zenith Satellite System
RADI	Remote Sensing and Digital Earth
RDCYIS	Regional Drought and Crop Yield Information System
RESAP	Regional Space Applications Programme for Sustainable Development
RFSA	Roscosmos Russian Federal Space Agency
SAR	Synthetic Aperture Radar
SFDRR	Sendai Framework for Disaster Risk Reduction
SIDS	Small Island Developing States
SPARRSO	Space Research and Remote Sensing Organization, Bangladesh
UAV	Unmanned Aerial Vehicle
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UN-GGIM	United Nations Committee of Experts on Global Geospatial Information Management
UNITAR	United Nations Institute for Training and Research
UNOOSA	United Nations Office for Outer Space Affairs
UNOSAT	United Nations Operational Satellite Applications Programme
UN-SPIDER	United Nations Platform for Space-based Information for Disaster
USAID	United States Agency for International Development
WFP	World Food Programme
WMO	World Meteorological Organization

Executive summary

The evaluation of the implementation of the Asia-Pacific Plan of Action on Space Applications for Sustainable Development (2018-2030) in its Phase I (2018-2022)[1] was launched in June 2022 and completed in September 2022. The evaluation was conducted by an external evaluator in accordance with the norms and standards of evaluation set out in the ESCAP Monitoring and Evaluation Policy and Guidelines. The evaluation covered the activities of the PoA (Phase I) and the cooperation practices of the ESCAP with other development partners, including other UN regional commissions and agencies, global/regional/subregional organizations, and academia to conduct activities in support of the implementation of the PoA (Phase I).

The purpose of the evaluation was to inform deliberations in the Ministerial Conference on the implementation of the PoA (Phase I) and provide recommendations for improvement in the implementation of the next phase of the PoA (2022-2026) in line with the 2030 Agenda for Sustainable Development. The evaluation applied a participatory approach and used various data collection techniques, including semi-structured interviews with key internal and external stakeholders, online surveys, and structured documentary analyses. It resulted in the following key findings and conclusions:

- The design and implementation of the Plan of Action (Phase I) were deemed to be highly relevant to the strategic development needs and priorities of the Member States. The findings also recognized that while the Plan of Action (Phase I) integrated a broad range of thematic areas, not all are entirely relevant to or are on the top of the priority list of all member States. This reflects the wide geopolitical, social and economic diversity of the Commission's members and associate members.

- The results achieved through the implementation of the Plan of Action and its interventions were found to be tangible. Preliminary responses to the secretariat's survey show over 550 actions from six countries alone in the six thematic areas of the Plan of Action in Phase I. The examples highlighted in the document ESCAP/MCSASD/2022/1[2] constituted successful approaches with definite scale-up potential.

- With regard to effectiveness, the Plan of Action served as an effective platform for accumulating and sharing knowledge on issues and building member States' capacity. In general, stakeholders from governments who participated in the evaluation are mainly subject-matter experts familiar with their own thematic areas of specialization, but , had limited knowledge of the Plan of Action in its entirety.

- The technical support and capacity-building activities offered by the secretariat within each of the thematic areas of the Plan of Action proved to be a successful model for further replication to cover existing and potentially new areas (including resilience and recovery from the impacts of COVID-19). However, the contribution of the Plan of Action implementation to the related SDGs needs to be more explicitly recognized and measured. A more structured pathway is needed to assess and monitor over the implementation period the contributions attributable solely to the Plan of Action to the achievement of the Sustainable Development Goals and the Sendai Framework for Disaster Risk Reduction.

[1] Hereafter the PoA (Phase I)

[2] Available at https://unescap.org/sites/default/d8files/event-documents/SECRETARIAT%20NOTE%20ON%20SPACE%2B%20_0.pdf

- In terms of efficiency, the secretariat successfully engaged diverse stakeholders and established a number of activity-based partnerships with United Nations agencies, development partners, as well as global, Asia-Pacific, and subregional organizations for the delivery of concrete initiatives. In the next phase of the Plan of Action, it is expected that such partnerships will be deepened and additional bilateral and multilateral cooperation in the form of South-South cooperation and triangular cooperation and interaction between RESAP members and the secretariat will be promoted.

- The secretariat successfully facilitated knowledge sharing from countries that have implemented and achieved results from the Plan of Action through user-oriented group meetings to disseminate knowledge to other countries for them to follow the practices. The secretariat should continue to prioritise capacity building and knowledge sharing as part of the next phase of Plan of Action with a clearer linkage between the Plan of Action implementation and its contribution to Sustainable Development Goals targets and related indicators.

- While the gender mainstreaming agenda remains ambiguous for most stakeholders, the increasing interest in the matter provides an opportunity to reinforce discussions in the next phase of the Plan of Action on the gender equality and social inclusiveness aspects.

Based on the findings and conclusions, the evaluation offers several strategic recommendations for the member States and the secretariat on implementing the next phase of the PoA.

Recommendations for the member States on the thematic areas and framework for the next phase of the PoA:

1) To accelerate the implementation of the Plan of Action through leveraging innovative digital applications, engaging end-users and the youth, effectively managing geospatial information, and strengthening partnerships based on national and local needs.

2) To prioritize the actions for implementation in the next phase of Plan of Action based on the national and local needs; and to strengthen the linkages of outcomes of actions taken in the next phase of Plan of Actions with the indicators of relevant Sustainable Development Goals taking into account new development trends and emerging issues (e.g., COVID-19 pandemic recovery)

3) To enhance sharing of knowledge, geospatial information, operational tools and experiences with other countries through regional cooperation mechanisms, such as the Regional Space Applications Programme for Sustainable Development.

4) To strengthen the role of National Focal Points of the Regional Space Applications Programme for Sustainable Development in implementing the Plan of Action and coordinating among related sectors at a country level and communicating the Plan of Action's achievements and results.

Recommendations for the secretariat on strengthening the partnership, communication, outreach and visibility and implementation of the next phase of the PoA:

1) To support member States in sharing of knowledge, geospatial information, operational tools and experiences with other countries in support of recommendation 4.

2) To support member States' efforts to enhance accelerating the implementation of the plan of Action in phase II through leveraging innovative digital applications, engaging end-users (such as the national disaster management organisations) and the youth, effectively

managing geospatial information, and strengthening partnerships at the regional level, and support countries, particularly those with special needs, to implement the Plan of Action with an explicit focus on gender mainstreaming.

3) To develop and implement a communication and outreach strategy to increase the awareness and visibility of the Plan of Actions achievements and results, including using online platforms and publications.

4) To support member States in operationalising “Space+ for our Earth and future”, through regional and subregional initiatives with capacity building and integrated approaches applying the Space+ for our Earth and future theme based on national and local needs using existing platforms and mechanisms.

5) To create awareness among member States, including planning ministries and other stakeholders involved in SDG monitoring, on the link between the Plan of Action and the SDG indicators.

1. Introduction

This section incorporates two key sub-sections: (i) background of the evaluation and the topic being evaluated, and (ii) purpose, objectives, and scope of the evaluation.

Background of the evaluation

This document presents the inception report on the evaluation of the implementation of the Asia-Pacific Plan of Action on Space Applications for Sustainable Development (2018-2030) in its Phase I (2018-2022) (hereafter "POA"). The evaluation started in June 2022 and completed in September 2022.

The Ministerial Declaration on Space Applications for Sustainable Development in Asia and the Pacific and the Asia-Pacific Plan of Action on Space Applications for Sustainable Development (2018–2030) were adopted at the Third Ministerial Conference on Space Applications for Sustainable Development in Asia and the Pacific, held in Bangkok, Thailand on 8 October 2018. (Hereinafter referred to as PoA). In May of 2019, the ESCAP Commission adopted resolution 75/6 entitled "Implementation of the Ministerial Declaration on Space Applications for Sustainable Development in Asia and the Pacific and the Asia-Pacific Plan of Action on Space Applications for Sustainable Development (2018-2030)".

In the resolution, the Executive Secretary was requested to carry out an evaluation of the implementation by the member States of phase I of the Asia-Pacific Plan of Action on Space Applications for Sustainable Development (2018–2030) and submit a report with recommendations to the Fourth Ministerial Conference on Space Applications for Sustainable Development in Asia and the Pacific scheduled for 26 October 2022.

Purpose, objectives, and scope

ESCAP secretariat commissioned the evaluation to inform the deliberations in the Ministerial Conference on the implementation of the PoA (Phase I) and provide recommendations for the implementation of the next phase of the PoA (Phase II). Overall, the objectives of the evaluation were as follows:

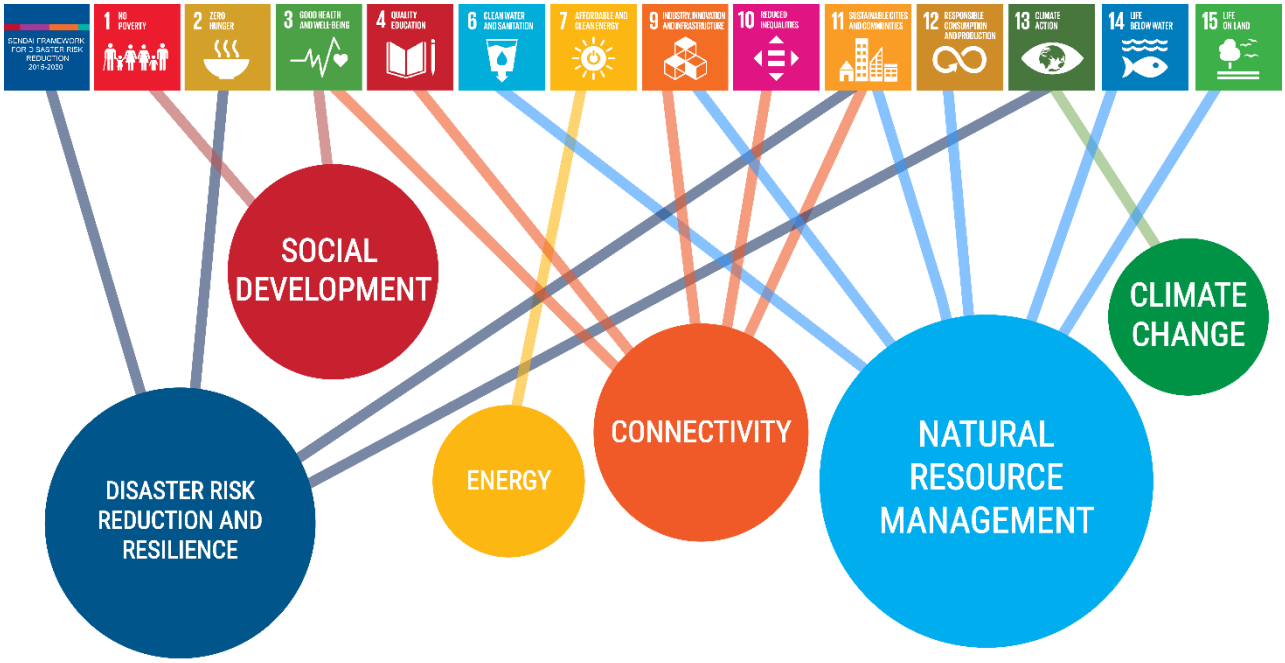
- To assess the implementation of PoA Phase I to achieve the objectives set out under each of the six thematic areas;
- To assess the performance of the activities and services provided by the secretariat to the member States in support of the implementation of the PoA Phase I using the standard evaluation criteria of relevance, effectiveness, efficiency, and gender mainstreaming; and
- To recommend areas for improvement in the next Phase (2022-2026) of the regional action plan and priority activities in light of the needs and requirements of the Member States in line with the 2030 Agenda for Sustainable Development and the context of the current pandemic.

The evaluation provided an opportunity for ESCAP stakeholders (particularly its member States and development partners) to share knowledge on improving the relevance of the work of the ESCAP under the PoA. Furthermore, member States and development partners were invited to provide feedback on the achievements of PoA (Phase I) and any associated challenges.

2. Object of the Evaluation

The PoA comprises of six thematic areas of action that collectively improve regional space cooperation in support of the regional road plan for implementing the 2030 Agenda for Sustainable Development in Asia and the Pacific. It comprises 188 actions in the following thematic areas: (a) disaster risk reduction and resilience; (b) natural resource management; (c) connectivity; (d) social development; (e) energy; and (f) climate change. All 188 initiatives will significantly contribute to 37 targets of 14 Sustainable Development Goals of the 2030 Agenda (SDGs) and Sendai Framework for Disaster Risk Reduction (SFDRR) (**Figure 1**).

Figure 1: Six Thematic Areas and SDGs and SFDRR



Source: ESCAP[3]

PoA is implemented through: (a) research and knowledge-sharing; (b) capacity building and technical support; and (c) Intergovernmental discussions and regional practices. Countries have ranked capacity-building and technical support as the most vital of the three.

The evaluation assesses past performance and contribute to the development of suitable recommendations for the PoA Phase II (2022-2026) and for building back better from the COVID pandemic.

The PoA Thematic Areas with Sub-Themes

a) **Disaster Risk Reduction and Resilience** ; Innovation; Risk reduction; Disaster assessment; Emergency response; Food production; Agroecosystem resilience; Precision agriculture; Climate hazards

b) **Natural Resource Management**; Water quality; Water resource management; Infrastructure; Natural and cultural heritage; Waste management; Urban planning; Consumption and production;

[3] https://www.unescap.org/our-work/ict-disaster-risk-reduction/gis-resilience

Marine and ocean pollution; Marine ecosystem; Coastal ecosystems; Sustainable fisheries; Forests; Biodiversity and endangered species; Land use change; Land degradation and desertification

c) Connectivity; Road traffic incident; Scholarships; Access to the Internet; Migration; Transport systems

d) Social Development; Poverty including human poverty and income poverty; Vulnerable groups; Health management; Contamination and pollution

e) Energy; Modern and sustainable energy services

f) Climate Change; Mitigation and adaptation

In total, within the framework of the PoA, there were a significant number of outputs delivered across those mentioned above six thematic areas, including geospatial practices compendium, reports, Working Group (WG) meetings, workshops, seminars, and advisory services provided to the member States, Intergovernmental Consultative Committee (ICC) on ESCAP Regional Space Applications Programme (RESAP) meetings, contribution to the regional space application of plan of action.

SFDRR and SDGs for PoA

Based on the interview's results in the inception phase, initial work has been done to establish the linkages between PoA thematic areas and SFDRR and SDGs (**ANNEX 4**). Updated indicators under the SDG target can be confirmed by United Nations Statistical Commission[4].

[4] E/CN.3/2022/2

3. Scope and Methodology

3.1 Evaluation scope

The evaluation assesses the PoA with the standard evaluation criteria of relevance, effectiveness, and efficiency introduced by the ESCAP. Gender mainstreaming aspects were addressed throughout the evaluation with appropriate methodology and evaluation questions.

The evaluation answers key questions listed in **Table 1** and identifies key lessons learned regarding the implementation of the PoA (Phase I). Evaluation limitations such as numbers of interviewed stake holders and COVID-19 pandemic impacts are described in 3.3 Evaluation limitation.

Table 1: Key Evaluation Questions

Evaluation criteria	Key Evaluation Questions
Relevance	• What were the key results achieved by member States through the implementation of the Regional Space Plan of Action? • Which thematic areas were considered most relevant and in line with the needs and requirements of the governments? • To what extent did the activities undertaken by ESCAP to implement the Regional Space Plan of Action contribute to the achievement of the SDGs? • What emerging needs for the next Phase of Regional Space Plan of Action more relevant for achieving the SDGs?
Effectiveness	• To what extent were the objectives and results of achievement, defined under each thematic area, achieved and to what extent were the outputs, defined under each thematic area, delivered? • How could ESCAP enhance the results of its support to the member States in the implementation of the next Regional Space Plan of Action to ensure it effectively helps with the achievement of the SDGs, and building back better from COVID?
Efficiency	• To what extent did ESCAP coordinate and cooperate with other development partners, including other UN entities, global/regional/subregional organizations in conducting activities in support of the implementation of the Regional Space Plan of Action. • How can the coordination and cooperation be further enhanced? • Was the Regional Space Plan of Action implemented in a timely manner?
Gender mainstreaming	• To what extent have gender considerations been mainstreamed into the design and implementation of the Regional Space Plan of Action? • What can be done support the implementation of gender-related SDGs in the next Regional Space Plan of Action?

(Source: ANNEX 2: Terms of reference)

3.2 Methodology

The evaluation utilizes various data collection techniques such as key informant interviews (semi-structured), online questionnaires, and structured documentary analyses. The evaluation prepares the Key Evaluation Questions based on the ToR. Quantitative and qualitative information was analyzed with

particular attention given to the cross-validation of data. In addition, the evaluation addressed the gender mainstreaming agenda through a set of key questions outlined in the ToR of the evaluation.

The methodology entails assessing the feedback of national and international stakeholders on whether gender mainstreaming was incorporated in the PoA (Phase I) and what should be done to improve gender consideration topics in the next phase of the PoA. The data gathered through in-depth interviews were validated through the desk research and review of relevant documents, study papers, and reports produced under the PoA (Phase I).

Overall, the evaluation consisted of four main phases: the inception phase, the field phase, the reporting phase, and the follow-up and information dissemination phase. During the inception phase, the evaluator:

- Reviewed the relevant documentation (including the reports of the meetings and workshops) and any relevant documents on the activities implemented under the PoA (Phase I)). Text mining[5] was used to explore the broad information to analyse.
- Prepared a tentative list of internal and external stakeholders.
- Elaborated on the evaluation framework and data collection tools such as interview protocols and a questionnaire.
- Delivered interviews to the reference group and IDD ESCAP members about the evaluation methodology and obtained their feedback on the methodology.
- Conducted preliminary interviews with related ESCAP members and stakeholders, and
- Prepared and finalized the inception report of the evaluation.

During the fieldwork phase, the evaluator took necessary measures to ensure adequate interaction and consultation with different internal and external stakeholders. Data was collected through various methods, including text mining, document review, questionnaires distributed among the national and international stakeholders, participant observation by participating in critical meetings and committees, and key informant interviews and focus group discussions. Mainly snowball sampling method was applied to maintain the interview's reliability and validity. The evaluator used the most reliable and appropriate sources of information available and triangulated (cross-validated) primary and secondary data, relevant studies, progress reports, reviews, websites, and studies. The evaluator analysed the reports produced within the framework of PoA (Phase I) as a primary source of information. Geospatial practices compendium books (2020, 2022)[6] contents were rearranged to examine the country-based activities. The evaluator also analysed (as a secondary source of information) event data from ESCAP websites and the documents produced by international development partners or national governments. The evaluation was supported by the team from the Space Applications Section, IDD of the ESCAP. In the course of the evaluation, the evaluator:

- Interviewed over 40 stakeholders and subject-matter experts, as well as the staff of the ESCAP.
- Participated in four critical meetings: Two Informal Working Group (IWG) meetings on the Preparations for the Fourth Ministerial Conference on Space Applications for Sustainable Development in Asia and the Pacific in July and August 2022, Expert Group Meeting (EGM) on Training on Use of Integrated Spatio-temporal Data in Local SDGs Monitoring and Decision-making

[5] Text mining transforms unstructured text into a structured format to identify meaningful patterns and insights.
[6] Geospatial Practices for Sustainable Development in Asia and the Pacific 2020: A Compendium (2020) and the upcoming 2022 edition

in August 2022, and the twenty-sixth session of the Intergovernmental Consultive Committee (ICC) in August 2022 (**ANNEX 6**).

- Reviewed over 130 United Nations and related other documents using text mining.
- Examined all IDD activities (2018-2022) extracted from the ESCAP website with text mining.
- Analysed all collected interview records.
- Prepared the independent evaluation part (part III) of the secretariat report[7].

The evaluator ensures that the reports' assessments are objective and balanced, that the findings are accurate and verifiable, and that the recommendations are realistic. The evaluator prepares an evaluation report following the norms and standards of the United Nations Evaluation Group's (UNEG), incorporated into the ESCAP Monitoring and Evaluation Policy and Guidelines. Furthermore, the quality of the report was assessed against the quality criteria used to review evaluation reports outlined in the evaluation ToR. A draft evaluation report was sent to the ESCAP to obtain its feedback on the report.

The final phase of follow-up and information dissemination involved gathering and incorporating the feedback from the ESCAP and reference group (as appropriate) into the evaluation report (including the management response to the recommendations).

Gender mainstreaming

Further, a human rights-based and gender-sensitive approach, consistent with the ESCAP Monitoring and Evaluation system, UNEG Handbook for Integrating Human Rights and Gender Equality Perspectives in Evaluations in the UN System, as well as the UNEG Norms and Standards for Evaluation, Ethical Guidelines and Code of Conduct, was ensured during the evaluation.

Survey questions acknowledged and addressed gender equality issues. It was intended to hold interviews with women stakeholders in all target countries. The data collection tools were deployed during the evaluation process to facilitate the inclusion of views and perspectives of stakeholders throughout the evaluation.

[7] ESCAP/MCSASD/2022/2. Available at https://unescap.org/sites/default/d8files/event-documents/REPORT%20OF%20THE%20EVALUATION_En_2.pdf

3.3 Evaluation limitations

Limited numbers of face-to-face interviews

Due to COVID situation and time constraints, face-to-face interviews with all country representative members are limited. However, through some unstructured-informal interviews during the inception and field survey phases at ESCAP and online, the evaluator was successful in obtaining some feedback on the interviewees' considerations and opinions on the evaluation.

Lack of field visits

In addition, due to COVID situation and time constraints, visits to relevant country counterparts and their organizations were not feasible. The field visits would have allowed a broader group of stakeholders to be approached and spoken to, allowing a broader diversity of views. However, the evaluator maximized the online interviews and group discussions to address this limitation.

Other inherent limitations in the design of this evaluation:

- Many respondents showed strong competence of the thematic area of the PoA within their area of work or specialization, but only a patchy understanding of the rest of the thematic areas. Respondents showed a fragmented understanding of the PoA (Phase I). This prevented stakeholders from providing a thorough assessment of the overall PoA (Phase I).

- Some stakeholders claimed they had not participated in the PoA. (Phase I). They were therefore unaware of its operations or related accomplishments. Only the projects and/or activities they took part in were known to those who had taken part in the PoA (Phase I).

- The evaluator interviewed 41 individuals with each interview duration lasting at least an hour. More interviews would have been ideal from a statistical perspective but this was not possible due to the limited time.

4. Evaluation findings

This chapter presents the evaluation findings based on the standard evaluation criteria of relevance, effectiveness, efficiency, and gender mainstreaming.

4.1 Relevance

Finding 1: Member States have achieved significant results through the implementation of the Regional Space Plan of Action (PoA).

Both the desk review and feedback from the state sector representatives validated specific tangible results of the PoA (Phase I). Desk reviews[8] show the following key results achieved by the member States through the implementation of the PoA.

- Overall, member States agreed that the PoA contributed to strengthening regional cooperation to leverage data sharing and promote big data analytics to contain the present and future spread of diseases and epidemics and to enhancing the capacity for mapping health risk hotspots using geospatial information and big data.
- The Regional Drought Mechanism successfully engaged users from different sectors, notably agriculture and water management, and promoted closer collaboration that resulted in more user-oriented products and services. In South-East, North, and North-East Asia, the Pan-Asia Partnership for Geospatial Air Pollution Information effectively enhanced capacity of governments to monitor and manage air pollution.
- In Indonesia, Malaysia, Thailand, and Viet Nam, pilot cities established a system to monitor and measure plastic waste leakage into the marine environment.
- In Uzbekistan, the government developed various maps to indicate the location of earthquakes. Through data visualization tools and dashboards, the government decision-making process and public aware were facilitated.
- In India, geospatial visualization tools and applications informed quarantine and containment strategy, the setting up of food distribution centers, and other state-specific actions. Also, in India, setting up and applying a digital platform to make biomass accessible and understandable through visualization helped in increasing the use of biomass.
- In China, a comprehensive assessment of overall SDG progress has been completed in Daqing, Zhejiang Province, through a data-driven measuring and evidence-based analysis. The governments of Indonesia and Thailand are using integrated Spatio-temporal data to monitor progress in achieving the SDGs.
- A pilot project supports the Sustainable Development Goals monitoring and reporting centers in Makassar and Bandung, Indonesia, and Songkhla, Thailand.
- To inform renewable energy development, Sri Lanka has combined different geospatial layers using the weighted overlay method in ArcGIS.

[8] Available at https://unescap.org/events/2022/fourth-ministerial-conference-space-applications-sustainable-development-asia-and

- Australia built a South-East Asian Open Datacube Technology to develop a range of derived products and services to support businesses and governments respond to the challenges of a changing climate.

- In Indonesia, the Center for Atmospheric Science and Technology (CAST) utilized space technologies in support of PoA and SDG implementation. For instance, Indonesia has developed smart cities in collaboration with the CAST. Furthermore, CAST reported that space applications had also been applied in disaster risk reduction, disaster management, agriculture, environmental protection.

- In Malaysia and the Philippines, it was reported that remote sensing data facilitated the monitoring of agricultural and forestry areas and urban development expansion.

Finding 2: Member States confirmed that the implementation of the PoA is highly relevant to their needs and priorities.

Almost all member States' representatives who participated in the evaluation confirmed that the PoA (Phase I) was relevant to their needs and priorities. The desk research validated the above feedback from the member States. Overall, representatives considered "Disaster Risk Reduction and Resilience" (DRR) and "Management of Natural Resource" (NRM) as the most relevant thematic areas. However, the six thematic areas are overlapping and interconnected. Thus, even if the starting point is only DRR or NRM, all six thematic areas can be considered relevant.

Most stakeholders (representatives of the member States and non-state organizations) engaged in the evaluation confirmed that the PoA was highly relevant to the needs and priorities of their countries. They agreed that the PoA (Phase I) contributed to building the capacity of member States to advance regional, sub-regional, and inter- regional cooperation. Several respondents requested additional time to gather relevant information about all thematic areas of the PoA (Phase I) to answer the evaluation questions. Meanwhile, both surveyed and interviewed respondents shared more details about why the PoA (Phase I) was perceived to be relevant to the needs of either their countries and/or regional connectivity. It was nevertheless obvious that the rationales varied depending on the given state's socio-economic priorities and infrastructure needs.

Desk research also confirmed that the member States recognized the significance of six thematic areas of the PoA (Phase I) and were relevant to sustainable development. Implementing the actions therein would significantly benefit derived from cooperation and coordination between and among the member States."

The above findings were also validated by the direct observations by participating in the first and second Informal Working Group (IWG), Expert Group (EG), and twenty-six Intergovernmental Consultative Committee (ICC) meetings, respectively. The agendas of meetings incorporated the implementation of the PoA (Phase I) and cross-cutting issues. According to the observations of the meetings, most found that the agenda of the sessions reflected development trends and issues in the region and was relevant to the needs and priorities of their countries/territories.

Most member State representatives confirmed that the thematic area of "Disaster Risk Reduction and Resilience" was either very relevant or partially relevant for their countries. The thematic area of "Management of Natural Resource" was the next priority, being identified by the survey respondents as either very relevant or partially relevant for their countries. The facts that through the implementation of the PoA from the member States were found in the Geospatial practices compendium book (2020)[9], twenty-three to five ICC meeting reports[10], and secretariat's questionnaire responses from the member

[9] Geospatial Practices for Sustainable Development in Asia and the Pacific 2020: A Compendium (2020) and the upcoming 2022 edition
[10] UNESCAP (2019; 2020; 2021) 23rd, 24th, and 25th Intergovernmental Consultative Committee (ICC) on Regional Space Application Program for

States to reflect the needs and priorities.

Geospatial practices compendium book (2020) was analyzed based on each country and visualized the number of implementations by thematic area of PoA and implemented member States. The data shows that 28 member States participate in PoA. Numbers of indicated thematic areas are also shown Disaster Risk Reduction and Resilience (DRR); 18, Management of Natural Resources (NRM); 15, Connectivity (CO);8, Social Development (SD); 13, Energy (EN); 6, and Climate Change (CC); 9 (Figure 2-3).

The country statements delivered at the 23rd, 24th, and 25th three ICC meetings held in 2019, 2020, and 2021 were also examined to clarify the reported PoA thematic areas' frequency. 17 member States (Figure 4). reported their progress in PoA at the meetings. Extracted frequencies of thematic areas implementation from the ICC reports indicate: DRR;14, NRM;12, CO;5, SD;5, EN;1, CC;6 (Figure 5).

The secretariat's questionnaire responses by the end of August of 2022 were also explored to figure out the frequency of the actions of each PoA thematic area taken by the 10 member States. Examined numbers of actions are: DRR;203, NR;168, CO;27, SD;47, EN;16, CC;51 (Figure 6).

These facts support the PoA thematic areas' relevance to the ESCAP members and associate members.

Figure 2: Reported PoA Phase I Implementation in the Publication

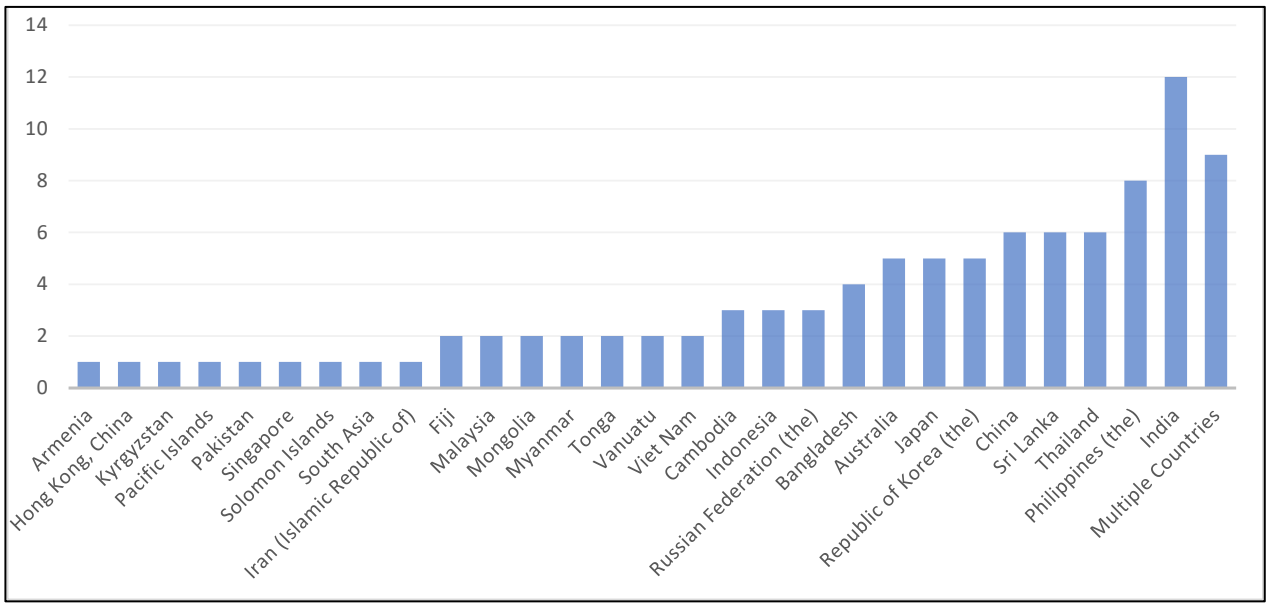


Figure 3: Reported PoA Phase I Implementation by Thematic Area

Sustainable Development (RESAP) reports

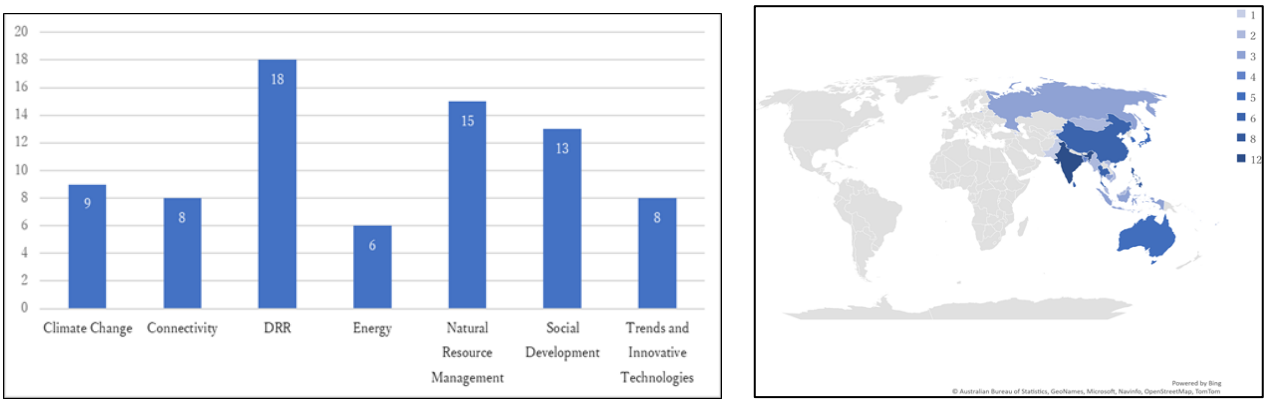


Figure 4: Reported PoA Implementation during the 23rd, 24th and 25th Meeting of the ICC (2019-2021)

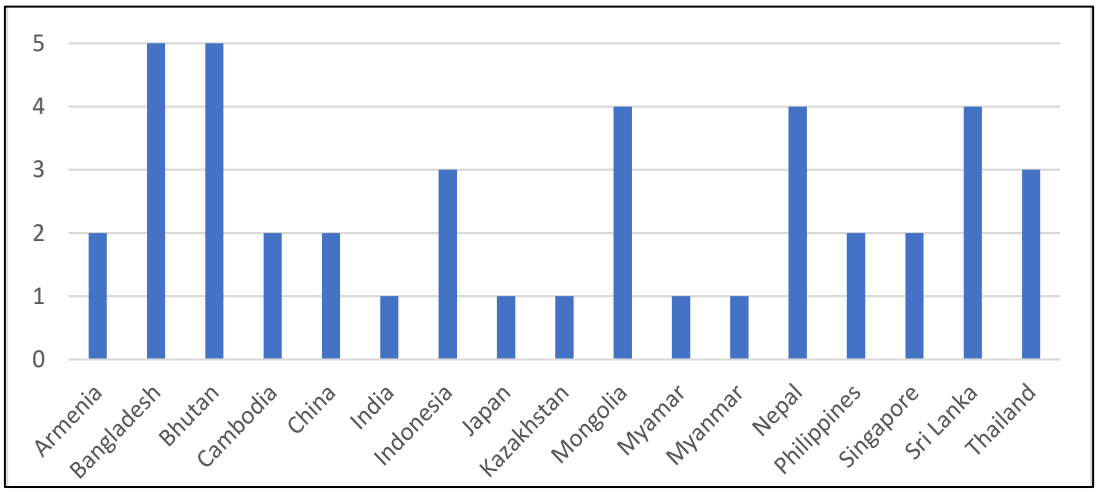


Figure 5:Reported PoA Implementation by Thematic Area during the 23rd, 24th and 25th Meeting of the ICC (2019-2021)

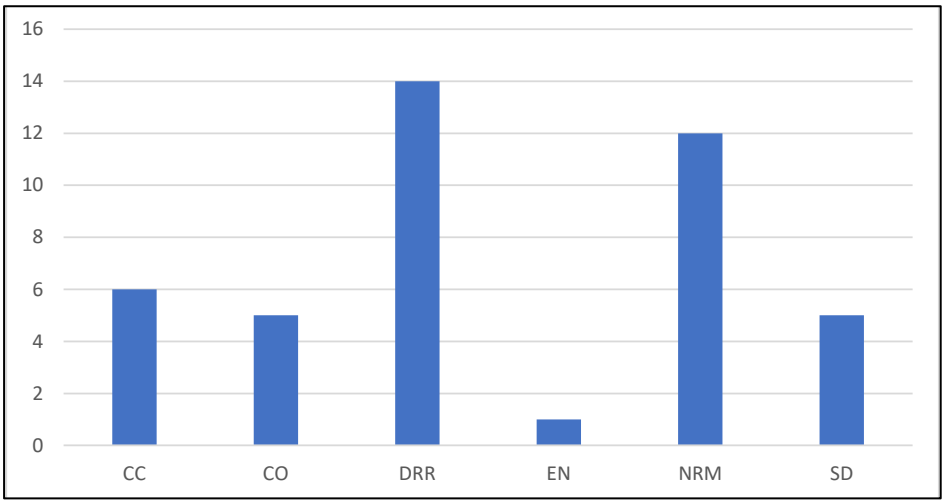


Figure 6: Reported Action Number by Each Thematic Area from the Questionnaire

POA Thematic Areas	Action Number / Countries										
	China	India	Sri Lanka	Uzbekistan	Indonesia	Thailand	Mongolia	Pakistan	Singapore	Bangladesh	Total
DRR	73	84	7	2	6	8	2	6	1	14	203
NRM	86	15	29	3	7	9	0	11	1	7	168
CON	15	3	6	0	2	1	0	0	0	0	27
SD	25	9	4	0	0	7	0	0	0	2	47
EN	3	5	6	0	1	1	0	0	0	0	16
CC	29	3	6	0	4	0	0	3	0	6	51
Total	231	119	58	5	20	26	2	20	2	29	512

The feedback gathered during in-depth interviews identified the priority thematic areas. The two areas ("DRR" and "NRM") were the most popular themes with several member States emphasizing the significance of these two thematic areas. Several stakeholders also reported on the "Connectivity" and "Social Development" thematic areas. A few stakeholders interviewed acknowledged being unfamiliar with the thematic areas and yet possessed some general knowledge about the PoA.

Several interviewed and surveyed respondents selected specific thematic areas because they were familiar with those areas. Several informants were unable to identify any thematic areas as most relevant to them.

Overall, the survey respondents and interviewed stakeholders shared their opinions regarding the relevance of the thematic areas to their needs and priorities:

- A UN officer who provides capacity buildings on DRR expressed that PoA comes directly from the country's needs. The officers always go back to the plan of action and see that the program and projects align with the targets set to support the implementation of PoA, especially DRR. So, the POA provides the officers with a guide and a pathway to achieving a common goal.

- A development partner explained that implementing the action plan focused on disaster risk reduction, which can be accelerated in the second phase through concrete initiatives. The space agency can provide the required satellite data directly to the ministry responsible for disaster preparedness and response when the disasters take place. The space agency can also identify the COVID hotspots and inform the responsible ministry that those areas should be contained. This information may also be made available to the citizen to avoid the infected areas.

- A representative of a member State mentioned that all six areas need to be considered in parallel when one works towards SDGs at the country level.

Finding 3: The implementations of the PoA contributed to the achievement of the SDGs

Most stakeholders confirmed that the implementations of the PoA (Phase I) contributed greatly to the achievement of the SDGs. However, many stakeholders (internal and external ones) were unclear about the specific link between the PoA and SDG targets

The stakeholders (those both interviewed and surveyed in the course of this evaluation) held different opinions about the SDGs to which the PoA had contributed. However, the majority of state and non-state sector representatives agreed that the PoA (Phase I) had contributed to the related SDGs.

It is noteworthy that only a few stakeholders asserted there was no awareness on the link between the PoA and any of the SDGs indicators. They expressed their interest in getting guidance and support from the ESCAP to link the PoA (either Phase I or Phase 2) with the SDGs indicators. Moreover, some

respondents (state sector representatives) were not familiar with the SDGs indicators.

Overall, both the desk research and the interviews with key stakeholders (including the staff of the ESCAP) confirmed that different groups of stakeholders (internal and external) and even institutions demonstrated divergent levels of comprehension of the linkage between the PoA and SDGs indicators.

The desk review also confirmed that the progress made under the thematic area directly contributed to the achievement of relevant SDGs.

Furthermore, most surveyed stakeholders believed that two thematic areas - "Disaster Risk Reduction and Resilience" and "Management of Natural Resource" - contributed significantly to related SDGs. The other four thematic areas were perceived to be next in line in terms of their contribution to the SDGs.

The feedback from stakeholders on the contribution of the thematic areas of the PoA (Phase I) to the SDGs is presented below:

- In Sri Lanka, it was reported that the PoA has provided an important basis for aligning the activities involving the use of space technology applications with the SDGs. Sri Lanka's major public sector user-agencies of space applications found that the PoA contributed to harnessing the potential of space applications in their work.

- The Government of Indonesia supported the institution in following the 17 SDGs. Furthermore, the Indonesian space institutions considered SDG 6, 11, 13, 14 and 15 are the most relevant to their activities.

- At the country level, the Plan of Action has established a foundation for connecting space technology initiatives with SDGs. Several large public sector user-agencies of space applications do this, which improves their usage of space applications.

- At the organizational level, as the national focal institution for space, the PoA has provided a practical basis for assessment of the level of use and need gaps of user agencies towards SDGs.

Finding 4: Stakeholders identified emerging needs for the next phase of the implementation of the PoA

Many stakeholders recognized the significance of the existing six thematic areas of the PoA (Phase I). They agreed that these areas remain relevant for the next phase of the PoA. Several interviewees also claimed that the current thematic areas adequately reflected and covered their emerging development needs, Space+.

Desk reviews[11] indicate the emerging needs for the next phase of the PoA as follows:

- As an accessible and sophisticated space application, private sector participation must be supported. For this, access to a lot of data, particularly geographical data, is required.

- Although data integration offers numerous advantages, it is still not widely used in many countries and industries. Accelerating the usage of new and varied data sources is also crucial.

- Data are dispersed across the data holders, data users, and data sharing networks at country and regional levels, even though several ESCAP member states have built their own national geospatial information platform.

- Coordination of platforms, networks, and data holders under one umbrella is a challenge at the

[11] Available at https://unescap.org/events/2022/fourth-ministerial-conference-space-applications-sustainable-development-asia-and

regional level.

- There are few intergovernmental framework agreements that outline the objectives, advantages, mission, and duties of advancing networked and integrated geospatial information in the area.
- Even nations that have made substantial progress in maximizing the use of geospatial technology still confront difficulties.
- As governments tracked the COVID-19 outbreak, the efficient use of non-traditional data sources—such as provided location information and human mobility data—became even more crucial.
- The growing use of geospatial technology and data raises questions about their ethical and responsible uses. Building the trust of citizens and safeguarding their privacy must coexist in harmony.
- Improving the data's accessibility, reliability, and usability for researchers and decision-makers are significant.

The followings are the summaries of emerging needs of PoA thematic areas presented in the 24th and 25th ICC meetings and secretariat's questionnaire in 2022[12](**Table 2**):

Table 2: Key Emerging Needs of PoA Thematic Areas

Thematic Area	Emerging Needs
Disaster Risk Reduction and Resilience	• Using space applications, such as geographic information systems and geospatial information technology, to improve disaster risk measuring tools, data collecting, analysis, and distribution.
Management of Natural Resources	• Promoting space applications for sustainable resource management and conservation, its analysis, and visualization, offer increasingly important input into decision-making processes for natural resource management. • Provide technical support to monitor forest dynamics and aid in forest management, and analyze coastal ecosystems, including sea surface temperature, chlorophyll, and fish distribution. • Provide technical support and develop the capacity to monitor land use change across all terrestrial ecosystems and identify land degradation and desertification for the use and integration of geospatial information systems, global navigation satellite systems, and satellite communications with marine and maritime services to combat illegal, unreported, and unregulated fishing. • Develop capacity to use space applications to assess the impacts of pollution near coastal areas and marine environments. • Provide access to archives of Earth observation data, in-situ measurements, and products derived from space data through the Space Climate Observatory.
Connectivity	• Data, research, and knowledge sharing, e.g., satellite images with high Digital Elevation Model (DEM) resolution

[12] 24th ICC report and the responses to the secretariat's questionnaire on needs for PoA implementation.

Social Development	• Enhancing digital advances (artificial intelligence, the Internet of Things, cloud computing, etc.) and involve end users from diverse sectors and the private sector. • Supporting Industry 4.0 by bolstering institutional capacity to handle geospatial information applications in SDGs. • Providing policy-level understanding of space and geoinformatics technological responsibilities.
Energy	• Research and map the renewable energy potential using space application.
Climate Change	• Integration of climate change into national and subnational planning, as well as formulating climate change policies, action plans, and finance frameworks. • Inform the design of initiatives to minimize the impacts of global warming.

In addition, the stakeholders shared their opinions concerning the emerging needs to be considered for the next phase of the PoA, which included the following. Data/Knowledge sharing, PoA implementation, Users, COVID-19 impact, Technology, and Capacity Building issues were mentioned. The direct opinion from stakeholders as follows.

Table 3: Emerging Needs Mentioned by Stakeholders[13]

Category	Emerging Needs Mentioned by Stakeholders
Data/Knowledge Sharing	• Providing user agencies with sufficient earth observation satellite data on a regular basis. It is important to give people specialized training on how to use space technology applications to build their skills in certain areas of work for the effective data/knowledge sharing. (Q, MS). • Recognized the importance of who and how to ensure the continuity and reliability of the data (I, AC). • Important factor to be considered in the next phase of POA is giving a special focus on the practical demonstration of the use of geospatial, IOT and AI technologies in achieving the goals with better outcomes. This will easily convince other developing countries to adopt new tech. for developments (Q, MS). • There should be a lot of focus on arranging for demonstrations of many different success stories to convince other countries to follow a similar pattern of tech usage. The way things are positioned for the next phase of implementation of POA is acceptable and it surely helps in achieving SDGs very effectively (Q, MS).
PoA implementation	• Need clarification on how POA is relevant to SDG achievement (Q, DP). • One key focus area should be awareness among member States, which is currently required (Q, DP). • It will be helpful for the POA to help more partners know and use the significant number of resources from China and AIRCAS, as well as those from Japan, South Korea, etc. (Q, MS)

[13] Q: Online Surveys (including questionnaire and email questions). I: Interviews, Dyadic Interviews, and FGDs. UN: UN agencies. DP: Developing Partners. MS: Member States. AC: Academia

	• To encourage the partners to implement the ESCAP Action Plan by providing the mutual benefit (I, UN) • To scale up the action plan from the transport sector and other sectors, such as climate change sector, ocean ecology, perseveration sector, and environmental sector (I, UN). • One of the significant lessons was learning to implement SDGs on the ground. It is to be noted that actual implementation of activities and projects may always differ from the original plan and hence it is important to adapt (I,MS). • It is vital for governments to understand the SDGs and their importance. In particular, the interconnected nature of SDGs due to certain overlaps in sub-indicators and the sub-goals. Sustainable development involves several interconnected aspects, such as, people, social-economic aspects, resource availability, technological aspects, etc. Many goals may have to be looked at simultaneously to bring in comprehensive focus on SDGs (I,MS). • For more efficient "on the ground" practical implementation for SDGs, all levels of government must be educated on the Sustainable Development Goals. This is due to difference in understanding and their varying approaches to solving issues. Educating and convincing are sometimes necessary to escalate the efficient implementation of SDGs at all levels (I,MS). • To coordinate the joint flagship programs among member countries for better SDGs(Q, MS).
Users	• We need human resources who can grasp the needs of the field and firmly connect the supplier side and the user side in the field, and how to foster such human resources (I, AC). • There have been some attempts to connect suppliers and the field in actual activities, but We feel that they have not yet reached this point. We have been aware of the importance of intermediary organizations from our experience (I, AC).
COVID Impact	• COVID-19, and consequent travel restrictions, stopped or delayed the entire global production supply chain (I, UN). • COVID-19 was also the main factor to slow down most countries' economies, forcing them to prioritize their budget for essential areas (I, DP). • COVID-19 made it impossible to do on-ground training (I, DP).
Technology	• Specific teams are also allocated to work on machine learning techniques, AI, drones, etc., in order to adopt new technologies in geospatial technology-based solutions. (I, India) Teams exploring advanced technologies are regularly tasked with developing and improving the knowledge to ensure that they are put to use and help in organizational growth (I, MS). • The technologies that are being talked about in the next phase are very generic and easily adoptable by any country in the region; hence the entire region can adopt these technologies, such as, space images, geospatial tools, deployment of tools on the Cloud platform, AI (machine learning & deep learning) techniques, IOT, sensors and even Drones are all very relevant and required for efficient implementation of SDGs (Q, MS). • According to the Plan of Action, space technology, space data, and GIS system can be utilized to identify renewable energy potential.

	Space technology can help countries, especially developing countries, perform historical data analysis on existing renewable resources, and help them evaluate the potential of renewable resources (I, UN).
Capacity Building	• Continuous work with local communities and local government bodies need to be done to update them on the technologies before they become obsolete. Continuous capacity building and communication is vital (I, MS). • Effective use of space-based thematic data, IoT, and Drones in proper planning and development helps the common man to adopt them in their own fields – however, subsidized costing by the Govt. will help faster adoption and better use of such tools (Q, MS). • Greater emphasis is to be given to capacity building amongst those countries that do not have exposure to the technology. This will strengthen such countries and push them towards adaptation (Q, MS). • Country-level training is still difficult to do because of the resource. Regional training is suitable for bringing everybody to the mindset that this is a valuable technology everybody should use (I, UN). • Trainer's training can be another target. If we invest in developing more trainers in each country, and they can expand the knowledge (I, UN).

4.2 Effectiveness

Finding 5: The secretariat delivered tangible outputs in support of the implementation by member States of the PoA and achieved results at the country level.

The secretariat produced remarkable outputs under the cross-cutting thematic areas of PoA, including:

1. A series of reports to assess progress in implementing the Asia-Pacific Plan of Action on Space Applications for Sustainable Development (2018–2030).

2. An online dashboard of geospatial practices to facilitate member States in tracking and reporting the implementation of the regional space Plan.

3. Guidelines were produced on how to use satellite data to produce maps and statistical tables using programs such as QGIS and RStudio. These guidelines highlight features of geospatially enabled programs and provide details of different types of open-source data.

4. Capacity building for 20 young officials to study remote sensing/GIS at CSSTEAP; ARTSA trainees to use geospatial information for COVID-19 analysis and decision-making for sustainable development.

Desk reviews[14] indicate the following summaries of objectives, results, and outputs delivered by member States through implementing the six thematic areas of the PoA.

Disaster Risk Reduction and Resilience: ESCAP member States continue the long-standing practice of sharing space-based data, products, and services free of charge to disaster-affected countries. Within the duration of phase I of the Plan of Action, for example, India has supported response to 84 disasters in 20 countries with more than 200 multi-resolution Indian remote sensing satellite datasets. ESCAP support was provided to the Mongolian National Remote Sensing Centre to operationalize its drought watch system, called Drought Watch System, under the Regional Drought Mechanism. Kyrgyzstan, Uzbekistan and Tajikistan received support to develop ground-based and satellite-derived data to develop drought maps and indicators. The second phase of the project is building a comprehensive Central Asia Drought Information System (CADIS) to enable an effective drought monitoring and early warning system.

Management of Natural Resources: In South-East, North, and North-East Asia, the Pan-Asia Partnership for Geospatial Air Pollution Information is boosting the capacity of over 10 countries to monitor and manage air pollution. The project has successfully demonstrated how geospatial information could be used to bring together multiple sectors, such as urban, water management, and forestry. Four pilot cities in Indonesia, Malaysia, Thailand, and Viet Nam are addressing plastic waste leaking into the marine environment. Their efforts were informed by combining data derived from satellite, ground sensors and metadata with digital innovations such as spectrometers, artificial intelligence, and the Internet of Things. Using machine learning and high-resolution optical imagery, Uzbekistan has started to digitize and analyse trees to automatically count trees over a vast area.

Connectivity: Member States have demonstrated operationally the applications of geospatial information for connectivity that supports the achievement of the SDGs. For instance, remote sensing data along with geo-spatial technology enabled the Government of India to build a GIS database on rural roads and the Russian Federation developed a complex data navigation system with a wide spectrum of system functions for effective transportations.

[14] Available at https://unescap.org/sites/default/d8files/event-documents/REPORT%20OF%20THE%20EVALUATION_En_2.pdf

Social Development: With the technical assistance of China and the Committee of Experts on Global Geospatial Information Management, the governments of Indonesia and Thailand are utilizing integrated spatio-temporal data to track their progress towards attaining the SDGs. In Thailand, Geospatial data is being used at the national level to map out poverty density in all provinces to guide poverty reduction efforts. Geo-Informatics and Space Technology Development Agency works with the National Housing Authority to create a database of low-income communities from aerial or satellite images using geo-informatics technology and tools.

Energy: Members of the UN's Expert Working Group on Universal Access to Modern Energy Services have discussed how geospatial data and analysis can be used for energy policy and planning. The meeting also highlighted opportunities for enhanced partnership and cooperation for spatial energy data. It is a step towards enabling members to be in a better position to map out renewable energy potential for use in national energy investment strategies.

Climate Change: The Secretariat has launched a project to promote climate-resilient agricultural development in the Lower Mekong River Basin. The project enables countries to access digital monitoring and early warning information for climatic shocks, water availability, and crop production forecasts. Australia has developed South-East Asian Open Datacube Technology to help governments and businesses adapt to climate change.

Examples of the feedback from stakeholders[15] on the delivered achievement are presented below:

- ICC Intergovernmental Consultative Committee provided a report on what we delivered. (I, UN)
- In Indian, the local agriculture department, forestry, geology and many others use the data to collaborate with the users/ farmers and teach them on sustainable farming practices based on scientific data analysis through specific projects. There are 28 State Remote Sensing centers in the country in addition to the National Remote Sensing Center. With a series of interventions, including space inputs – wherever applicable, the country is able to see visible results and outcome. (I, MS)
- There are many achievements that we can proudly mention today as part of the implementation and success achieved. Each of the sectors, natural resources, social aspects, livelihood and many more, have been well addressed as part of the execution. (I, MS)

Finding 6: Stakeholders needed further support in implementing the next phase of the PoA, including COVID recovery.

The stakeholders expressed the need to continue the secretariat's support, including advisory services and capacity-building services (including recovery from the impacts of COVID-19) and introduce measurable and realistic performance and target indicators linked to the SDGs and SFDRR to gauge the progress made.

Desk reviews indicate that the potential of geospatial and digital advances in Asia and the Pacific is still untapped. Many applications remain in the pilot stage or are still at a stage of transitioning to operational-level applications. An analysis of the needs expressed by ICC member countries in the past two years shows that the demand for capacity building on the use of digital innovations remains high.

[15] Q: Online Surveys (including questionnaire and email questions). I: Interviews, Dyadic Interviews, and FGDs. UN: UN agencies. DP: Developing Partners. MS: Member States. AC: Academia.

The stakeholders were asked to clarify the factors impeding the achievement of the PoA (Phase I) results and to develop further recommendations for implementing the next phase of the PoA. The interviewees shared many factors[16], some of which might be clustered into two primary directions: factors linked to knowledge sharing and capacity building. The followings are the short summary and direct opinions of each factor.

Knowledge Sharing

ESCAP is expected to collect the needs of member States and take the initiative to share ideas to lead the solutions by data/knowledge sharing.

- Better awareness of the POA and how it will help countries achieve SDGs are necessary, however, not much information is available in this regard. ESCAP leads to collecting the challenges in this subject from the relevant organizations and governments. (Q, DP)
- ESCAP could look for inputs from each of the countries on the specific needs and connect such countries with those that have already demonstrated positive outcomes, which in a way will help in capacity building and also skill development amongst recipient countries. This will help the region to achieve SDGs at a faster rate and remain sustainable, especially under the prevailing climate scenarios. (I, MS)
- ESCAP needs to spend time on knowledge discovery, establish connectivity between providers and proposers, impart best practices to all regional partners, organized a series of workshops with practical deliverables, use the resource persons from the countries who have successful models etc. (I, MS)
- Data sharing needs to be promoted among the member countries. Particularly, Small Island nations and developing states may need to be prioritized to receive such exposures through technology sharing. (I, MS)
- The capacity building/ knowledge sharing could be done between developed and developing countries to promote technology/knowledge sharing for successful usage by target countries. (I, MS)
- ESCAP should strengthen their Plan of Action by providing more concrete research results on space applications in the transport sector and should reach out to various countries and seek for their financial support on this research to showcase tangible benefits of space applications. (I, UN)
- Mainly by way of measures that result in adequate access to satellite data, and through enhanced HR capacity building support, through partnerships. (Q,MS)
- ESCAP is an influential organization. ESCAP can collect the issues of member States and play a role to take initiative actions to solve the issues. (I, DP)

Capacity Building

Stakeholders requested the secretariat to provide more capacity-building activities. Capacity building topics were highlighted, including space application for youth and knowledge sharing of best practices to promote the adoption of new technologies.

In general, stakeholders applauded continuing cooperation with ESCAP, appreciated the technical assistance, as well as the advisory and capacity-building activities provided under the PoA and suggested emphasizing the connection between the space application and the SDGs and SFDRR. In addition, some stakeholders noted that the COVID-19 pandemic had a significant impact on PoA implementations. Based on the examination of all related activities (2018-2022) extracted from the ESCAP website, it is also obvious that the number of stakeholders who benefit from the PoA's capacity-building activities must still be increased.

[16] Q: Online Surveys (including questionnaire and email questions). I: Interviews, Dyadic Interviews, and FGDs. UN: UN agencies. DP: Developing Partners. MS: Member States. AC: Academia.

In addition, some state-level authorities emphasized the complexity of achieving the PoA's objectives in its challenges is linked to the low or moderate commitment of the national governments to strengthen the relevant policies. Therefore, the PoA's objectives should consider the country-specific environment and interregional political and socioeconomic constraints.

Furthermore, in-depth interviews and online surveys with external stakeholders (representatives of member States) revealed that several respondents lacked sufficient awareness of certain PoA theme areas (Phase I). Many were only able to remark on the activities they participated in (because of their familiarity with the activity).

4.3 Efficiency

Finding 7: The secretariat was efficient in cooperating with development partners and implementing joint initiatives.

Desk research and in-depth interviews confirmed that the ESCAP built efficient cooperation with external parties (including the UN agencies, developing partners, and Academia) through activity-/project-based joint initiatives and formal cooperation agreements.

Formal partnership practices of the ESCAP cover cooperation through the framework agreements under the Memorandum of Understanding (MoU) (UNITAR) and the Memorandum of Agreement (MoA) (MGA and Keio University), which cover the effective intervention areas of the ESCAP such as capacity building, knowledge sharing, and technical support. These partnerships show that the broad range of activities, including UN agencies, developing partners, and Academia, are covered and well-coordinated and cooperated to proceed with the PoA.

In-depth interview results confirmed that stakeholders are of the view that ESCAP was very efficient in coordinating and cooperating with other development partners, including other UN entities and international organizations, in conducting activities in support of the implementation of the PoA (Phase I).

Desk research[17]confirmed that the activities of the PoA (Phase I) were coherent with or complemented the activities implemented by other development partners, UN agencies, and regional international organizations.

Collaboration between member States, the UN system, regional and international organizations, and other stakeholders has improved as a result of the Plan of Action's implementation. By improving the synchronization of pertinent projects and broadening the base of stakeholders around a shared topic, such collaboration might be increased even further. According to the secretariat, the PoA also leads the mobilization of resources worth $4 million[18]. Greater coordination between existing mechanisms and ESCAP partnerships is intended, although no new mechanisms are planned. These include the Asia-Oceania Group on Earth Observations (AOGEO), Asia-Pacific Space Cooperation Organization, Asia-Pacific Regional Space Agency Forum, the Committee of Experts on Global Geospatial Information Management (UN-GGIM), the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER), United Nations Satellite Center, Multi-GNSS Asia (MGA), the Center for Space Science and Technology Education in Asia Pacific (CSSTEAP), ASEAN Research and Training Center for Space Technology and Applications (ARTSA), UN University, and Asian Institute of Technology (AIT). For instance, since 2018, ESCAP has funded 24 young professional officials to attend post-graduate courses at CSSTEAP and ARTSA on remote sensing and GIS for disaster management and sustainable development due to scholarships from India and Thailand.

To complete the 2020 edition of the Geospatial practices compendium[19], one of the significant outputs indicates a part of coordination and cooperation results, including 89 member States organizations and 10 partner institutions.

Stakeholders mentioned the following on the ESCAP coordination and cooperation[20].

- Together with ESCAP, we focus on training and capacity and providing emergency response maps to

[17] Available at https://unescap.org/events/2022/fourth-ministerial-conference-space-applications-sustainable-development-asia-and
[18] Available at https://unescap.org/sites/default/d8files/event-documents/REPORT%20OF%20THE%20EVALUATION_En_2.pdf
[19] Geospatial Practices for Sustainable Development in Asia and the Pacific 2020: A Compendium (2020) and the upcoming 2022 edition
[20] Q: Online Surveys (including questionnaire and email questions). I: Interviews, Dyadic Interviews, and FGDs. UN: UN agencies. DP: Developing Partners. MS: Member States. AC: Academia.

member states. (I, UN)

- The institution is mostly satisfied with ESCAP activities, such as willingness to share information along with the invitations to events. (I, MS)
- Reaching out to countries with great capacity, e.g., Japan, Korea, China, Thailand, and provide support to landlocked countries that need space technology. (I, UN)
- There were good collaborations between ESCAP and Countries' database (Data Sharing). This data sharing allows for effective and fast problem identification ad solution implementation. Moreover, the data sharing allows for a stronger basis to carry out workshops and capacity-building activities. (I, MS)
- Enhancing the use of geospatial information and applications systems by providing consultancy data and local SDG assessment. (I, MS)
- Coordination and cooperation can be even more effective if some kind of an "Affinity Group" is established amongst the regional partners and select a lead coordinator and UN representative. (I, MS)

Finding 8: Coordination and cooperation with external partners need to be enhanced in the next phase of the PoA.

The discontinuation of interactions with some external stakeholders, mostly due to exogenous reasons such as a high turnover rate in national line ministries, hindered the continuity of knowledge transfer and ownership to some degree at the national level.

Desk reviews[21] indicate that more collaboration might speed up Plan of Action phase II. For instance, sharing satellite images for post-disaster monitoring and response is typical, but collaboration might be broadened to pre-disaster risk management. A virtual network of satellites that exchanges high-resolution satellite imagery with varied nations might reduce disaster risk. Integrating satellite-derived data with socio-economic data (such as the socio-economic profile of low-income individuals or businesses in disaster hotspots) helps improve proactive risk reduction and post-disaster recovery and relief.

In-depth interviews confirmed that many of the representatives of the member States have a positive perception of the cooperation and partnership praxis with the ESCAP secretariat and other member States. However, most stakeholders focused on the issues related to the specific thematic areas of PoA. Therefore, they can enhance their awareness of all thematic areas of PoA, which will help more effective their implementation in the next phase of PoA through coordination and cooperation with external partners.

In addition, several respondents reported not having up-to-date information concerning research papers and recommendations generated and/or published under the PoA (Phase I) and/or not recognizing the PoA. (Phase I). Some external stakeholders demanded greater communication and advocacy from the secretariat while recognizing that ESCAP was keeping them updated on the PoA's outputs through the official reporting structure. Desk research also revealed that representatives of member states, non-state sectors, and international organizations attended PoA (Phase I) events and workshops. A thorough examination of the event material, such as ICC meeting documents, confirmed that attendees varied to some degree. Although external factors cannot be controlled, efforts can be encouraged to maintain the

[21] https://unescap.org/events/2022/fourth-ministerial-conference-space-applications-sustainable-development-asia-and

same pool of state sector officials and subject-matter experts (including representatives of international organizations and other UN entities) at events.

The stakeholders shared their opinion about alternatives to sustain resourceful coordination and cooperation with the Secretariat and the team of the PoA initiative. Especially collaborations among/with experts, demonstrations to the Ministries, and action-oriented workshops are recommended.

- Members of ESCAP should share their leadership expertise and best practices in order to enhance the lives of people in developing countries. As a higher-level activity, collaborative expert work on specific and actual cases is offered. There should be more data and information on the website.

- There should be a bigger focus on capacity building and knowledge sharing as part of the next POA, as technologies and combinations of technologies are involved concerning implementation. It is always better to hold action-oriented workshops to disseminate the knowledge to other countries, so they can follow the best practices.

- ESCAP needs to ensure that the data is in the same format across the ministries and the governments. It should demonstrate to various ministries how the data from satellites can help them accomplish their duties. ESCAP should create a capacity-building program to bring the ministry to work together with the space agency. The agency should focus on how people make use of the space application and how they can monitor it.

The direct opinions from stakeholders[22] are:

- Deeper discussions with experts are desired from ESCAP. Collaboration of experts is desired. Collaborative expert work on concrete and real cases is suggested as a deeper level activity. (I, MS)

- More information and statistics are desired to be seen on the website (I, MS).

- Promoting more bilateral and multilateral cooperation in the form of South-South cooperation at the regional level (Q,MS)

- Enhancing the volume of interacting activities with RESAP members and the secretariat (Q, MS)

- Strengthen the publicity of the plan and carry out projects with practical significance (Q,MS)

Finding 9: Stakeholders confirmed that the PoA was carried out in a timely manner.

Many stakeholders indicated that the PoA (Phase I) activities were carried out in a timely way. A few respondents indicated that various delays were caused by external factors, such as the onset of the COVID-19 pandemic, whereas the other survey respondents had no opinion or information regarding any delays. In-depth interviews with the secretariat did not reveal any major delays.

Furthermore, desk research and in-depth interviews highlighted the changing nature of the PoA's structure (Phase I). It was contingent upon a customer-centric strategy handled by the secretariat to meet the foreseeable and ad hoc demands of member States to the most significant degree feasible. For instance, within the scope of the PoA (Phase I), the secretariat conducted virtual workshop sessions to discuss the impact of the COVID-19 pandemic on the transport sector, as well as COVID-19 responses and recovery measures and published pertinent study papers. The design of the PoA (Phase I) did not include

[22] Q: Online Surveys (including questionnaire and email questions). I: Interviews, Dyadic Interviews, and FGDs. UN: UN agencies. DP: Developing Partners. MS: Member States. AC: Academia.

any COVID-19-related subjects for debate and analysis, as COVID-19's existence was not confirmed until December 2019.

4.4. Gender mainstreaming

Finding 10: Stakeholders generally agreed that gender considerations were mainstreamed in the implementation of the PoA, although some acknowledged having limited knowledge of the subject matter

Some evidence supporting this finding includes:

- Two women senior officials from Indonesia and the Philippines led the IWG and ICC under the PoA and played a central role in these meetings.
- Desk research verified gender balance in the attendance of meetings, workshops, and training organized under the PoA.

Notable responses[23] received from stakeholders also support the above finding:

- "My institution tries to avoid gender bias, and recruitment is done according to capabilities and abilities". (I, MS)
- "All participating countries need to ensure that gender representations are integrated into the PoA". (Q, MS)
- In the Chinese Academy of Sciences, there were programmes that aim at providing more opportunities for female scientists. (I, MS)

Some stakeholders were found to have limited knowledge of gender mainstreaming and have some concerns regarding its implementation. A few interviewees did not foresee the need for gender-sensitive strategies in the space application sector. Others stated that existing inequalities and discriminatory gender stereotypes limited women's participation in social, economic, and political spheres.

Most stakeholders supported the idea of incorporating gender-sensitive topics into the next phase of the PoA. In addition, they also supported going beyond the gender mainstreaming agenda and suggested focusing on social inclusiveness (for all marginalized groups, the elderly, children, etc.) of the space application sector. Several stakeholders also highlighted a definite need to improve the capacity of the member States to develop and implement gender-sensitive policies and interventions in the sector.

Therefore, a gender-inclusive approach will require more visibility which is a bit lacking in the present state. Overall, stakeholders generally suggested the following directions concerning enhancing gender mainstreaming in the next phase of the PoA:

- Prior to the next regional space plan of action, a few sensitization workshops may be held to ensure that all member countries are on a common platform about gender sensitivities.
- Promote women scientists' participation.
- PoA needs to offer more opportunities for women.

[23] Q: Online Surveys (including questionnaire and email questions). I: Interviews, Dyadic Interviews, and FGDs. UN: UN agencies. DP: Developing Partners. MS: Member States. AC: Academia.

5. Conclusions

The evaluation reached the following conclusions:

- **Relevance:** The design and implementation of the PoA (Phase I) were highly relevant to the strategic development needs and priorities of the Member States. The PoA demonstrated thematic diversity, flexibility, and a user-centric approach to cope with the emerging needs and requirements of the Member States. While the PoA (Phase I) integrated a broad range of thematic areas, not all of them are entirely relevant to or are on the top of the priority list of all member States for reasons such as their geopolitical, social, and economic diversity.

- **Relevance:** The tangible results (including the outcomes of the sessions of the thematic working groups and expert groups) achieved through the implementation of the PoA (Phase I) and its interventions constitute the most successful approaches with definite scale-up potential. The extent of contribution of the PoA (Phase I) to the SDGs was based on the subjective perceptions of the informants and their knowledge of the SDGs. Overall, the above contribution was attributable to the thematic PoA (Phase I) on activity-based intervention. There is an obvious need to build solid knowledge of the Member States on the PoA and related SDGs and increase their awareness for the implementation.

- **Effectiveness:** Member States have reported achievements under each thematic area of the PoA (Phase I). However, several representatives of the Member States who participated in the evaluation had fragmented information of the PoA (Phase I) in its entirety. There were aware of certain aspects of the PoA that are to their area of expertise. Overall, the PoA (Phase I) served as a platform for accumulating and sharing knowledge on issues and building Member States' capacity.

- **Effectiveness:** The secretariat provided advisory services and capacity-building activities to support the implementation of the PoA. The evaluation found that ESCAP's support proved to be a successful model for further replication to cover existing and potentially new areas (including resilience and recovery from the impacts of COVID-19). However, the PoA (Phase I) and its links to the SDGs needs to be further clarified and recognized. It also lacked a structured pathway to assess and monitor thoroughly the progress made with regard to its outcomes attributable solely to the PoA (Phase I).

- **Efficiency:** Overall, the secretariat successfully engaged diverse stakeholders and established activity-based cooperation and partnerships with United Nations agencies, development partners, and global, Asia Pacific, and sub-Asia Pacific organizations within the strategy of the PoA (Phase I) through the concrete initiative. In the next phase of the PoA, it is expected that more bilateral and multilateral cooperation in the form of South-South cooperation and interaction between RESAP members and the secretariat will be promoted.

- **Efficiency:** The secretariat facilitated knowledge sharing from countries that have implemented and achieved good results from the PoA through action-oriented group meetings. The secretariat should further strengthen its capacity building and knowledge sharing and clarify the link between the PoA and SDGs.

- **Gender mainstreaming:** While the gender mainstreaming agenda remains ambiguous for stakeholders, the increasing interest in the matter provides an opportunity to reinforce discussions in the next phase of the PoA on the gender equality and social inclusiveness aspects.

6. Recommendations

Based on the findings and conclusions, the evaluation issued several strategic recommendations for the member States and secretariat on improving the design and implementation of the next phase of the Plan of Action.

Recommendations addressed to member States

Recommendation 1: To accelerate the implementation of the Plan of Action through leveraging innovative digital applications, engaging end-users and the youth, effectively managing geospatial information, and strengthening partnerships based on national and local needs.

Recommendation 2: To prioritize the actions for implementation in the next phase of Plan of Action based on the national and local needs; and to strengthen the linkages of outcomes of actions taken in the next phase of Plan of Actions with the indicators of relevant Sustainable Development Goals taking into account new development trends and emerging issues (e.g., COVID-19 pandemic recovery)

Recommendation 3: To enhance sharing of knowledge, geospatial information, operational tools and experiences with other countries through regional cooperation mechanisms, such as the Regional Space Applications Programme for Sustainable Development.

Recommendation 4: To strengthen the role of the National Focal Points of the Regional Space Applications Programme for Sustainable Development (RESAP) in implementing the Plan of Action and coordinating among related sectors at a country level and communicating the Plan of Action's achievements and results.

Recommendations addressed to the secretariat

Recommendation 1: To support member States in sharing of knowledge, geospatial information, operational tools and experiences with other countries in support of recommendation 4.

Recommendation 2: To support member States' efforts to enhance accelerating the implementation of the plan of Action in phase II through leveraging innovative digital applications , engaging end-users (such as the national disaster management organisations) and the youth, effectively managing geospatial information, and strengthening partnerships at the regional level, and support countries, particularly those with special needs, to implement the Plan of Action with an explicit focus on gender mainstreaming.

Recommendation 3: To develop and implement a communication and outreach strategy to increase the awareness and visibility of the Plan of Actions achievements and results, including using online platforms and publications.

Recommendation 4: To support member States in operationalising "Space+ for our Earth and future", through regional and subregional initiatives with capacity building and integrated approaches applying the Space+ for our Earth and future theme based on national and local needs using existing platforms and mechanisms.

Recommendation 5: To create awareness among member States, including planning ministries and other stakeholders involved in SDG monitoring, on the link between the Plan of Action and the SDG indicators.

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ANNEX 1: Management response

The secretariat's background document titled "Evaluation of the implementation of the Asia-Pacific Plan of Action on Space Applications for Sustainable Development (2018–2030) in its Phase I (2018-2022)" for the Ministerial Conference contains the management response to the evaluation. The report is available at: https://unescap.org/sites/default/d8files/event-documents/REPORT%20OF%20THE%20EVALUATION_En_2.pdf

ANNEX 2: Evaluation term of reference

Evaluation of the
implementation of the Asia-Pacific Plan of Action on Space Applications for Sustainable Development (2018–2030)

in its Phase I (2018-2022)

Terms of Reference

1. INTRODUCTION

The Third Ministerial Conference on Space Applications for Sustainable Development in Asia and the Pacific, held in Bangkok, Thailand on 8 October 2018, culminated in the adoption of the Ministerial Declaration on Space Applications for Sustainable Development in Asia and the Pacific,[24] and the Asia-Pacific Plan of Action on Space Applications for Sustainable Development (2018–2030) (hereinafter used as PoA).[25] Subsequently, the adoption of the ESCAP resolution 75/6[26] titled "Implementation of the Ministerial Declaration on Space Applications for Sustainable Development in Asia and the Pacific and the Asia-Pacific Plan of Action on Space Applications for Sustainable Development (2018–2030)", in May 2019.

In the resolution, the Executive Secretary was requested to carry out an evaluation of the implementation by member States of phase I of the Asia-Pacific Plan of Action on Space Applications for Sustainable Development (2018–2030) and to submit a report with recommendations to the fourth Ministerial Conference on Space Applications for Sustainable Development in Asia and the Pacific, which is scheduled to be held on 26 October 2022.

This document outlines the purpose, scope, approach, and timeline of the evaluation of the PoA to be conducted by an external evaluation consultant. The evaluation will be conducted in accordance with the ESCAP Monitoring and Evaluation Policy and Guidelines and the United Nations Evaluation Group norms and standards for evaluation. Evaluation at ESCAP is an important function that seeks to determine as systematically and objectively as possible the relevance, effectiveness, efficiency, and sustainability of its subprogrammes, projects or initiatives.

The report of the evaluation will be reviewed by members of an Informal Working Group which will be established in preparation of the Fourth Ministerial Conference. Experts from member countries will be invited to participate and provide comments on the draft report.

1.2 Purpose and objectives

As outlined above, this evaluation is intended to inform the deliberations in the Fourth Ministerial Conference on the implementation of the PoA Phase I (2018-2022) and provide recommendations in order to improve the implementation, during the next Phase (2022-2026), at both regional and country-level in the six thematic areas outlined in PoA. The evaluation will therefore be formative in nature, i.e. it reflects the evolving needs of countries, emerging technologies, shifting priorities and unforeseen challenges arising in the region, to strengthen future programme of work and implementation modalities of the PoA. The evaluation will also provide ESCAP stakeholders, particularly its member States and development partners, with the opportunities to share information and ideas to improve the relevance of the work of ESCAP under the PoA and regional cooperation framework.

The evaluation objectives include:

(i) To assess the implementation of PoA Phase I in terms of the achievement of the objectives set out under each of the six thematic areas.

[24] https://www.unescap.org/sites/default/files/MCSASD_2018_2E_Final_25102018.pdf

[25] https://www.unescap.org/resources/asia-pacific-plan-action-space-applications-sustainable-development-2018-2030

[26] https://www.unescap.org/sites/default/d8files/event-documents/ESCAP_RES_75_6_E.pdf

(ii) To assess the performance of the activities and services provided by the secretariat to the member States in support of the implementation of the PoA Phase I using the standard evaluation criteria of relevance, effectiveness, efficiency, and gender mainstreaming.

(iii) To recommend areas for improvement in the next Phase (2022-2026) of the regional action programme and priority activities in light of the needs and requirements of the member States in line with the 2030 Agenda for Sustainable Development and in the context of the current pandemic.

1.3 Object of the evaluation

The PoA consists of six thematic areas of work that together contribute to the strengthening of regional space cooperation in support of the regional road map for implementing the 2030 Agenda for Sustainable Development in Asia and the Pacific. It includes 188 actions in the following thematic areas: (a) disaster risk reduction and resilience; (b) management of natural resources; (c) connectivity; (d) social development; (e) energy; and (f) climate change. All 188 actions will significantly contribute to 37 Targets of 14 Goals of the 2030 Agenda for Sustainable Development.

The implementation modalities of PoA are through: (a) research and knowledge-sharing; (b) capacity building and technical support; and (c) intergovernmental discussions and regional practices. Among the three, capacity-building and technical support has been identified by countries as the priority.

The evaluation will take stock of past performance and will help with necessary proposals to be fit for purpose for the PoA in its Phase II (2022-2026) and for building back better from the COVID pandemic.

1.4 Scope of the evaluation

The evaluation will cover the implementation of the PoA from 2018-2022. The following tentative questions to be answered by the evaluation under each evaluation criteria are proposed. Further refinement of the questions will be made during the inception phase of the evaluation.

Evaluation criteria	Tentative evaluation questions
Relevance	• What were the key results achieved by member States through the implementation of the Regional Space Plan of Action? • Which thematic areas were considered most relevant and in line with the needs and requirements of the governments? • To what extent did the activities undertaken by ESCAP to implement the Regional Space Plan of Action contribute to the achievement of the SDGs? • What emerging needs for the next Phase of Regional Space Plan of Action more relevant for achieving the SDGs?
Effectiveness	• To what extent were the objectives and results of achievement, defined under each thematic area, achieved and to what extent were the outputs, defined under each thematic area, delivered? • How could ESCAP enhance the results of its support to the member States in the implementation of the next Regional Space Plan of Action to ensure it effectively helps with the achievement of the SDGs, and building back better from COVID?

Efficiency	• To what extent did ESCAP coordinate and cooperate with other development partners, including other UN entities, global/regional/subregional organizations in conducting activities in support of the implementation of the Regional Space Plan of Action. • How can the coordination and cooperation be further enhanced? • Was the Regional Space Plan of Action implemented in a timely manner?
Gender mainstreaming	• To what extent have gender consideration been mainstreamed into the design and implementation of the Regional Space Plan of Action? • What can be done support implementation of the gender related SDGs in the next Regional Space Plan of Action?

2. OVERALL EVALUATION APPROACH

In assessing the results achieved, the evaluation will make use of a theory of change approach to understand the actual results achieved and the process of achieving results. The development of the theory of change should be guided by the results framework of the project and the actual implementation strategy and delivery of outputs.

The evaluation will apply a mixed-method approach through a combination of quantitative and qualitative analysis to inform findings. Due to the ongoing travel restrictions and health concerns caused by the COVID-19 pandemic, which are likely to persist during 2022, the evaluation methodology will rely primarily on desk review and remote data collection methods. The evaluation will apply multiple methods, and cross-check information and data from different sources to ensure confidence in the findings.

The evaluation process will involve several phases as outlined below:

Phases
a) **Inception and scoping phase** • Preliminary review of documentations • Interviews with members of the reference group and other stakeholders to understand their expectations and requirements • Preparation of an evaluation inception report detailing the evaluation scope, questions, methodology and workplan • Meeting with the evaluation reference group to present the inception report and seek clearance to proceed • Preparation of questionnaires and interview guides
b) **A desk review of documents.** The following documentations will be provided to the consultant • List of stakeholders • Relevant publications, research papers, training materials • Press releases • Meeting reports (e.g., attendance lists, minutes/reports, agenda, handouts, questionnaire results) • Mission reports • Project documents, including revisions, progress reports, terminal reports • Relevant agreements

c) **Surveys of stakeholders (electronic)** • An electronic survey will be administered targeting government officials and implementing partners • Development and administration of the survey by the consultant • Data analyses
d) **In-depth individual interviews (video/audio call)** • Governmental stakeholders • Development partners • ESCAP staff
e) **Focus group discussions (video conference)** • If needed, the consultant may conduct in-depth discussions with selected stakeholders on certain specific topics or issues
f) **Observation (virtual meeting)** • The consultant will be given an opportunity to observe the proceedings of any significant events during the period of the evaluation.
g) **Preparation of the evaluation report and presentation of findings** • Preparation of a brief note containing the preliminary findings, conclusions and recommendations of the evaluation • Meeting with the reference group to present (using PowerPoint) and discuss the preliminary evaluation results • Preparation of a draft evaluation report and review of the draft report by the evaluation reference group • Finalization of the evaluation report along with an evaluation brief (3-page summary) following a standard format to be provided by ESCAP

Data will be disaggregated by sex and other relevant social categories. The evaluation will undertake a transparent and participatory evaluation process that will involve male and female stakeholders identified in the stakeholder analysis, including: the reference group, development partners and target beneficiaries in all key evaluation tasks.

In analyzing the data, the evaluation will use qualitative and quantitative approaches, and provide charts and direct quotations. Using the data to assess evaluation against the selected criteria. Gender and human rights mainstreaming are essential components of data analysis in all ESCAP evaluations and take place on three levels: 1) programme design; 2) programme implementations; 3) programme outcomes. Data analysis will enable useful, evidence-based findings, conclusions and recommendations.

The evaluation methodology will also take into consideration the ethical principles in evaluation as details in the UNEG ethical guidelines for evaluation.

3. ROLES AND RESPONSIBILITIES

3.1 Evaluation reference group

To support the independence of the evaluation, the Evaluation Unit, SPMD will manage and oversee the entire evaluation process. An evaluation reference group will be established to support the evaluation and will comprise the following members:

- Deputy Executive Secretary (Chair)
- Director, Strategy and Programme Management Division
- Director, Information and Communications Technology and Disaster Risk Reduction Division (IDD)
- Chief, Space Application Section, IDD
- Evaluation Unit, SPMD (secretariat)

The reference group provides technical and methodological guidance to the evaluation process; reviews and approves the selection of the consultant, terms of reference and inception report; provides quality control of the evaluation report and validation of recommendations; and ensures adherence to ESCAP Evaluation Policy and Guidelines and the use of evaluation outputs, including the formulation of the evaluation management response and follow-up action plan.

4.2 Evaluator

The evaluator will assume overall responsibility for carrying out the evaluation. This includes, among other activities, managing the work, ensuring the quality of interviews and data collection, preparing the draft report, presenting the draft report and producing the final report after comments have been received in line with standard templates provided by ESCAP. The evaluator must have:

- Good and specific knowledge and experiences on space technology applications in multiple sectors, including major development trends and issues in Asia and the Pacific, particularly in the areas of space technology applications, disaster risk reduction, information and communications technology or related fields.
- Knowledge of the United Nations System; principles, values, goals and approaches, including human rights, gender equality, cultural values, the Sustainable Development Goals and results-based management.
- Professional and technical experience in evaluation (application of evaluation norms, standards and ethical guidelines and the relevant organizational evaluation policy and promotion of evaluation and evidence-based learning).[27]

5. OUTPUTS

The following outputs will be delivered to ESCAP:

1. Inception report detailing the approach of the evaluator, workplan and evaluation logical framework
2. Results of data collection exercise
3. First draft of the evaluation report
4. Presentation (ppt) on findings, conclusions and recommendations
5. Final evaluation report
6. An ESCAP evaluation brief

The draft evaluation report will be shared with key stakeholders prior to finalization. The final evaluation report will be posted on ESCAP's public website.

[27] See Standard 3.1. Competencies, UNEG. 2016. Norms and standards for evaluation.

ESCAP adheres to the UNEG Ethical Guidelines and Code of Conduct in evaluation and all staff and consultants engaged in evaluation are required to uphold these standards. To this end, ESCAP has developed a Consultants Agreement form (see Annex 4) that evaluators are required to comply upon signing the consultancy contract.

6. WORKPLAN

The evaluation will be undertaken from xxx to xxx. The evaluation budget includes a consultancy fee to be determined based on professional qualifications and the duration of the contract.

Phase	Timelines
ɛption • Desk review of documentations • Interviews with members of the reference group • Preparation of an inception report for the evaluation • Presentation of evaluation methodology and tools to the reference group	
a collection and analysis • Desk review of documentations • Preparation of surveys and interview guides • Administration of stakeholder survey • Interviews and focus group discussions with stakeholders • Attendance in the project final meeting • Data compilation and analysis	
ɔort preparation and conclusion • Submit a brief report containing the preliminary findings, conclusions and recommendations • Meet with the reference group to discuss the preliminary findings and recommendations • Prepare a first draft evaluation report • Prepare a revised draft evaluation report • Final evaluation report and summary note	

ANNEX 3: Evaluation matrix

Questions to be Asked	Substantiating Evidence/ Indications of Results	Source of Information	Methos for Data Collection
Relevance			
• What were the key results achieved by member States through the implementation of the Regional Space Plan of Action? • Which thematic areas were considered most relevant and in line with the needs and requirements of the governments? • To what extent did the activities undertaken by ESCAP to implement the Regional Space Plan of Action contribute to the achievement of the SDGs? • What emerging needs for the next Phase of Regional Space Plan of Action more relevant for achieving the SDGs?	• Key stakeholders' reports of project design and scheduled interventions • Initial research results used to guide interventions in phase I	• Project-related documents, Websites; PPTs, and websites • Questionnaire survey answers • Minutes of the interviews and focus group discussions • Direct observation of meetings and committees	Online interviews Online questionnaire survey Desk review Focus Group Discussion Participant Observation of critical meetings and committee
Effectiveness			
• To what extent were the objectives and results of achievement, defined under each thematic area, achieved and to what extent were the outputs, defined under each thematic area, delivered? • How could ESCAP enhance the results of its support to the member States in the implementation of the next Regional Space Plan of Action to ensure it effectively helps with the achievement of the SDGs, and building back better from COVID?	Key stakeholders' comments on results and how and why they occurred Key project reports of results and how and why they occurred	• Project related documents, Websites; PPTs, and websites • Questionnaire survey answers • Minutes of the interviews and focus group discussions • Direct observation of meetings and committees	Online interviews Online questionnaire survey Desk review Focus Group Discussion Participant Observation of critical meetings and committee
Efficiency			
• To what extent did ESCAP coordinate and cooperate with other development partners, including other	Key stakeholders' comments on efficiencies	• Project-related documents, Websites; PPTs, and	Online interviews

UN entities, global/regional/subregional organizations in conducting activities in support of the implementation of the Regional Space Plan of Action. • How can the coordination and cooperation be further enhanced? • Was the Regional Space Plan of Action implemented in a timely manner?	Key documents and reports	websites • Questionnaire survey answers • Minutes of the interviews and focus group discussions • Direct observation of meetings and committees	Online questionnaire survey Desk review Focus Group Discussion Participant Observation of critical meetings and committee
Gender Mainstreaming			
• To what extent have gender consideration been mainstreamed into the design and implementation of the Regional Space Plan of Action? • What can be done support implementation of the gender related SDGs in the next Regional Space Plan of Action?	Key stakeholders' comments on gender mainstreaming Key documents and reports	• Project-related documents, Websites; PPTs, and websites • Questionnaire survey answers • Minutes of the interviews and focus group discussions • Direct observation of meetings and committees	Online interviews Online questionnaire survey Desk review Focus Group Discussion Participant Observation of critical meetings and committee

ANNEX 4: SFDRR and SDGs for PoA

SFDRR and SDGs for PoA

The linkage between PoA thematic areas and SFDRR and SDGs (**Table A1**). Updated indicators under the SDG target can be confirmed by United Nations Statistical Commission[28].

Table A1: SFDRR and SDGs for PoA

Disaster Risk Reduction and Resilience		
Sub Theme	SFDRR/SDGs	Target
Innovation	SFDRR	4 priorities; Understanding disaster risk; Strengthening disaster risk governance to manage disaster risk; Investing in disaster risk reduction for resilience; Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction
Risk Reduction, **Disaster assessment,** **Emergency response**	**SDG 11** Sustainable cities and communities	**Target 11.5**: By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations
Food production, **Agroecosystem resilience,** **Precision agriculture**	**SDG 2** Zero hunger	**Target 2.4**: By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality
Climate hazards	**SDG 13** Climate action	**Target 13.1**: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

Management of Natural Resources		
Sub Theme	SDGs	Target
Water quality, **Water resource management**	**SDG 6** Clean water and sanitation	**Target 6.1**: By 2030, achieve universal and equitable access to safe and affordable drinking water for all **Target 6.3**: By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater, and substantially increasing recycling and safe reuse globally

[28] E/CN.3/2022/2

		Target 6.5: By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate **Target 6.6**: By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers, and lakes
Infrastructure	**SDG 9** Industry, innovation and infrastructure	**Target 9.4**: By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities
Natural and cultural heritage, **Waste management,** **Urban planning**	**SDG 11** Sustainable cities and communities	**Target 11.4**: Strengthen efforts to protect and safeguard the world's cultural and natural heritage **Target 11.6**: By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management **Target 11.7** 11.b By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015–2030, holistic disaster risk management at all levels
Consumption and production	**SDG 12** Responsible consumption and production	**Target 12.2**: By 2030, achieve the sustainable management and efficient use of natural resources
Marine and ocean pollution, **Marine ecosystem,** **Coastal ecosystems,** **Sustainable fisheries**	**SDG 14** Life below water	**Target 14.1**: By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution **Target 14.2**: By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans **Target 14.4**: By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics **Target 14.5**: By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information **Target 14.7**: By 2030, increase the economic benefits to small island developing States and least developed countries from the sustainable use of marine resources,

		including through sustainable management of fisheries, aquaculture and tourism
Forests, **Biodiversity and endangered species,** **Land use change,** **Land degradation and desertification**	**SDG 15** Life on land	**Target 15.1**: By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements **Target 15.2**: By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally **Target 15.3**: By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world **Target 15.4**: By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development **Target 15.5**: Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species

Connectivity		
Sub Theme	SDGs	Target
Road traffic incidents	**SDG 3** Good health and well-being	**Target 3.6**: By 2020, halve the number of global deaths and injuries from road traffic accidents
Scholarships	**SDG 4** Quality Education	**Target 4.7**: 4.b By 2020, substantially expand globally the number of scholarships available to developing countries, in particular least developed countries, small island developing States and African countries, for enrolment in higher education, including vocational training and information and communications technology, technical, engineering and scientific programs, in developed countries and other developing countries
Access to the Internet	**SDG 9** Industry, innovation and infrastructure	**Target 9.5**: 9.c Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020
Migration	**SDG 10** Reduced inequalities	**Target 10.7**: Facilitate orderly, safe, regular and responsible migration and mobility of people, including through the implementation of planned and well-managed migration policies
Transport systems	**SDG 11** Sustainable	**Target 11.2**: By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in

	cities and communities	vulnerable situations, women, children, persons with disabilities and older persons **Target 11.3**: By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries

Social Development		
Sub Theme	SDGs	Target
Poverty including human poverty and income poverty , **Vulnerable groups**	**SDG 1** No poverty	**Target 1.5**: By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters
Health management, **Contamination and pollution**	**SDG 3** Good health and well-being	**Target 3.9**: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination 3.d Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks

Energy		
Sub Theme	SDGs	Target
Modern and sustainable energy services	**SDG 7** Affordable and clean energy	**Target 7.3**: **7.b** By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States and landlocked developing countries, in accordance with their respective programs of support

Climate Change		
Sub Theme	SDGs	Target
Mitigation and adaptation	**SDG 13** Climate action	**Target 13.2**: Integrate climate change measures into national policies, strategies and planning

ANNEX 5: Data collection tool

Interview Protocol		
1.	Name of Interviewee(s)	
2.	Organization	
3.	Position	
4.	Location	
5.	Date of Interview	
1. Relevance		
1.1	What were the key results achieved by member States through the implementation of the Regional Space Plan of Action?	
1.2	Which thematic areas were considered most relevant and in line with the needs and requirements of the governments?	
1.3	To what extent did the activities undertaken by ESCAP to implement the Regional Space Plan of Action contribute to the achievement of the SDGs?	
1.4	What emerging needs for the next Phase of Regional Space Plan of Action more relevant for achieving the SDGs?	
2. Effectiveness		
2.1	To what extent were the objectives and results of achievement, defined under each thematic area, achieved and to what extent were the outputs, defined under each thematic area, delivered?	
2.2	How could ESCAP enhance the results of its support to the member States in the implementation of the next Regional Space Plan of Action to ensure it effectively helps with the achievement of the SDGs, and building back better from COVID?	
3. Efficiency		
3.1	To what extent did ESCAP coordinate and cooperate with other development partners, including other UN entities, global/regional/subregional organizations in conducting activities in support of the implementation of the Regional Space Plan of Action.	
3.2	How can the coordination and cooperation be further enhanced?	
3.3	Was the Regional Space Plan of Action implemented in a timely manner?	

4. Gender Mainstreaming	
4.1	To what extent have gender consideration been mainstreamed into the design and implementation of the Regional Space Plan of Action?
4.2	What can be done support implementation of the gender related SDGs in the next Regional Space Plan of Action?

ANNEX 6: The list of interviewed stakeholders and participant observations

No.	Month /Date	Title	Attendees (Number of Participants）
Interviews, Dyadic Interviews, and Focus Group Discussions			
JUNE			
1	15	Informal information collection	ICC member (1)
2	17	Initiation of the Asia Pacific POA	Chief, Evaluation Unit (1)
3	21	Reference Group Interview	Chief and Officer SAS IDD (2)
4	21	POA implementation of UN organization	Officer, UNITAR UNOSAT (1)
5	27	Reference Group Interview	Chief, Evaluation Unit (1)
JULY			
6	5	Focus Group Discussion (FGD) for Evaluation Direction	Group discussion with IWG members (UNCC Participants) (9) from Mongolia, United States, Sri Lanka, Thailand, the Philippines
7	6	Evaluation direction	PhilSA National Focal Point (1)
8	6	Dyadic interview， Pont Discussions on recommendations	Professors, Keio University (2) Including former space agency staff
9	12	Reference Group Interview	Director IDD (1)
10	14	Thematic POA implementation	Director Energy Div.(1)
11	14	Interview, POA implementation	Chief, DRR, IDD (1)
12	14	FGD, POA implementation	SAS, IDD (3)
13	15	Dyadic interview, POA implementation	MGA (2) Representative and key staff.
14	15	Thematic POA implementation	Director Transport Div. (1)
15	18	FGD, Indonesian Expert POA implementation	Indonesian Expert (12) University's professors, government officers, government institute officers, and related organization officers.
16	20	FGD, Chinese Expert POA implementation	Chinese Expert (4) University's professors, government officers, government institute officers, and related organization officers.

17	20	POA implementation in India	ICC member from ISRO (1)
18	26	POA implementation	Professor, AIT (1)
19	27	Dyadic interview, POA implementation	Geospatial Officers, ADPC (2) Director and lead officers.
20	27	Disaster Risk Reduction and POA implementation	Project Director and Co-Chair for ADRC and Sentinel Asia, etc. (1)
AUGUST			
21	15	Dyadic interview, POA implementation	Professors, Keio Univ. SDG Help Desk, 5D World Map (2)
Email Contact Questions (Data Collections)			
22	July	Further questions (2 times) by emails, POA implementation	An expert from ISRO (1)
23	July	Further questions by emails, POA implementation	An expert from AIRCAS (1)
24	July	Further questions by emails, POA implementation	AIT (1) Professor
25	July	Further questions by emails, POA implementation	Geospatial Officers, ADPC (2) Director and lead officers.
26	July	Further questions by emails, POA implementation	Project Director and Co-Chair for ADRC and Sentinel Asia, etc. (1)
27	Aug.	Email discussions, POA implementation	UN/OSAT (1)
28	Aug.	Email discussions, POA implementation	SAS, IDD (1)
29	Aug.	Further questions (2 times) by emails, POA implementation	ICC members (1)
Participant Observations (including presentations and responses)			
30	5 July	1st IWG meetings, including PoA Implementation evaluation	Invited key stakeholders from the member States
31	2 Aug.	2nd IWG meetings, including PoA Implementation evaluation	Invited key stakeholders from the member States
32	4 Aug.	Expert Group Meeting, including PoA implementation activities	Invited experts, including key stakeholders from the member States
33	18 Aug.	26th Intergovernmental Consultative Committee (ICC) meeting, including PoA Implementation evaluation	Invited key stakeholders from the member States