16 April 2021

English only

Committee on the Peaceful Uses of Outer Space
Scientific and Technical Subcommittee
Fifty-sixth session
Vienna, 19–30 April 2021
Item 5 of the provisional agenda*
Space technology for sustainable socioeconomic development

Status and outlook of the Space4Water Project of the United Nations Office for Outer Space Affairs: three years of Space4Water

I. Introduction

1. The Space4Water Project started three years ago and its main pillar, the Space4Water Portal, was launched and brought online on 30 October 2018 at the Eighth Award Ceremony of the Prince Sultan Bin Abdulaziz International Prize for Water (PSIPW) which was hosted at the United Nations Headquarters in New York. The Portal has been developed by the Office for Outer Space Affairs and funded by the Prince Sultan Bin Abdulaziz International Prize for Water (PSIPW).

2. The Space4Water Project, the umbrella initiative, includes a conference series on Space Technologies for Water Management as well as efforts to strengthen links between expert communities of the space and water sector overall. Special focus is also given to capacity-building and inclusiveness of actors from developing countries. The Space4Water Portal is a multi-stakeholder Internet platform for interdisciplinary knowledge exchange on space solutions and technologies for water-related topics. Its vision and objectives are detailed in A/AC.105/C.1/2019/CRP.11 and on the Portal[1] itself.

3. Since 2018, the Office and PSIPW have been promoting the use of space-based technology for increased access to water. At this point, PSIPW had already financially been contributing to organising an international conference series on the use of space technologies in water management for 10 years. Within the first funding period of the Space4Water Project (2018–2020), one conference took place in Islamabad, Pakistan.

4. Taking due note of Member States' valuable contributions, as well as the Office's Space4Water Portal initiative, the Office for Outer Space Affairs shared input with the United Nations Department of Economic and Social Affairs to draft a background note for the Secretary General for the High-Level 2020 United Nations

* A/AC.105/C.1/L.373.
[1] https://space4water.org/about/vision-mission

Ocean conference[2] to support the implementation of Sustainable Development Goal (SDG) 14, Life below water. Moreover, input has been provided to UN-Water for the publication of CEB/2020/HLCP39/CRP.3 Draft SDG6 (Water) Global Acceleration Framework.

5. Water conservation and resource management represent some of the most critical environmental challenges currently facing humankind. They are needed to achieve numerous SDGs, particularly SDG 2 – Zero Hunger, SDG 3 – Good Health and Well-being, SDG 6 – Clean Water and Sanitation, SDG 7 – Affordable and Clean Energy, 11 – Sustainable Cities and Communities, SDG 13 – Climate Action, SDG 14 – Life below Water, SDG 15 – Life on Land. Strategies for securing and safeguarding humanity's water resources will be required in all sectors to avert a global humanitarian crisis. Space technology and applications play a key role in understanding global water cycles, mapping water courses or aquatic ecosystems, and monitoring and mitigating the effects of floods and droughts.

II. The Space4Water Project

6. The Space4Water project is structured with three pillars aiming to impact from a local to a global level:

(a) Foster scientific exchange via conferences, to inform decision-making and have an impact on policy;

(b) Reach and inform users worldwide, via the Space4Water Portal, to showcase excellent work and allow users to find partners based on their expertise or regional focus; and

(c) Community building via interactive Space4Water Portal stakeholder meetings with the aim to create an Experts Committee for Quality Assurance and Scientific Guidance.

7. In the past three years, funding covered the development of the Portal, as well as support for a conference series on Space Technologies for Water Resource Management. A new MoU between the Office for Outer Space Affairs and PSIPW now ensures funding for the project for further six years.

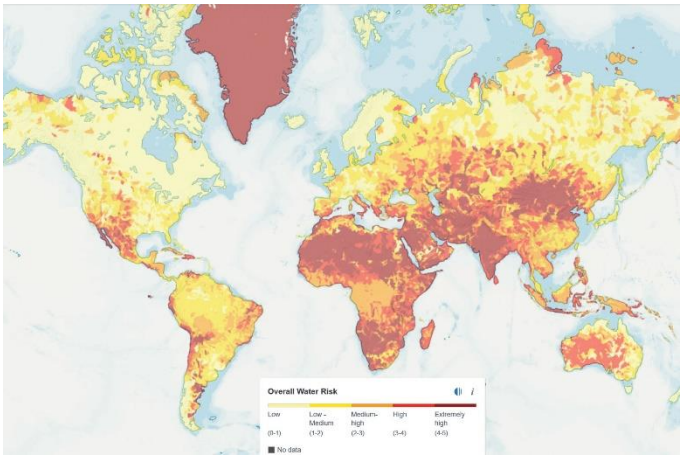
A. Why Space4Water?

8. "Space and water" is an agenda item of the Committee on the Peaceful Uses of Outer Space since its forty-seventh session in 2004.

9. Water scarcity is a major global challenge. While water demand and population rapidly increase, we are faced with consequences of urbanization, development pressures, and increased industrial demands on the resource. Water use worldwide has been increasing at a rate of 1 per cent per year since the 1980s, driven by population growth, socioeconomic development and changing consumption patterns. Global demand is expected to continue increasing at a similar rate until 2050, with 20–30 per cent of this increase due to increased demand in the industrial and domestic sectors.

[2] This conference has been postponed until further notice due to the COVID-19 pandemic.

Figure 1
Water stress globally



Source of the map: World Resources Institute, 2020.

10. The SDG 6 Synthesis Report 2018 on Water and Sanitation shows that 2 billion people worldwide live in countries experiencing high water scarcity, and four billion people experience severe water scarcity for at least one month per year. Water stress (see figure 1) will increase, as demand for water grows, and the effects of climate change increasingly impact life on Earth at an increasing rate.

11. Water is a connecting factor among the SDGs. It can contribute significantly to achieving SDGs other than SDG 6. To ensure the sustainability of life on Earth, a strategic and collaborative approach to water management is necessary. The two examples of using space technologies are significant to achieve SDG 6:

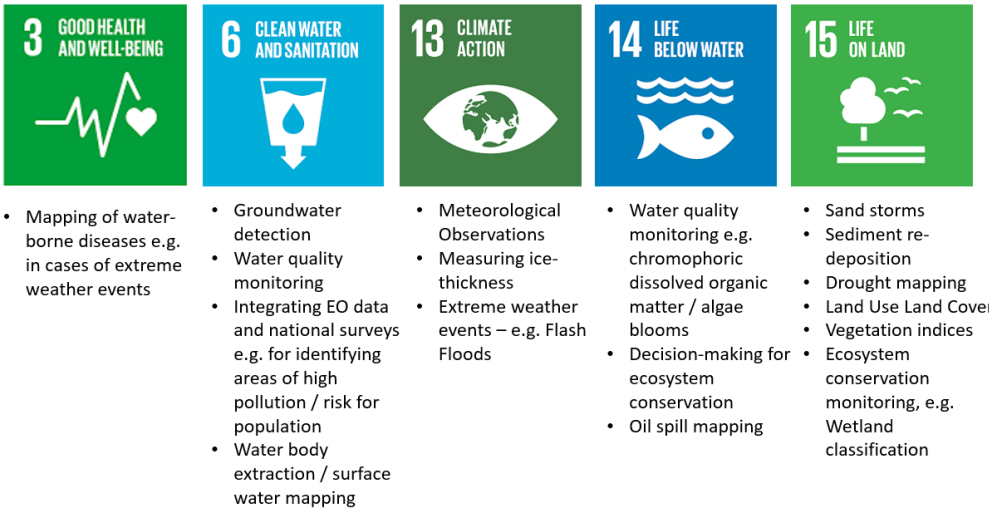
(a) Groundwater sources have been depleted at ever increasing rates within the last years. Space technologies contribute towards the achievement of SDG 6, by providing ability to detect them and map the levels in aquifers;

(b) Surface water bodies water quality is especially important if used for drinking water and sanitation, but also for achieving a fair distribution of our increasingly limited freshwater resources. Space technologies facilitate the mapping of surface water bodies and their water quality.

12. Aquatic life, oceans, and entire ecosystems such as wetlands and coastal ecosystems are affected by activities or phenomena that can be observed from space. Among those human activities, natural resources extraction and pollution from various sources can be observed, such as discharge from mining activities and agriculture, or the extensive use of groundwater for agriculture.

13. Space applications such as Earth Observation data and navigation are also crucial for disaster management and crisis response efforts. The effects of climate change are often related to water, such as changes of rainfall patterns, extreme weather events such as flash floods, extreme drought, sandstorms, hurricanes, or cyclones. Prediction of such events becomes increasingly important to save human lives and mitigate the effects of water-related disasters. Moreover, space technology allows the monitoring of glacier retreat and melting of permafrost, sea level rise, surface water temperatures and many hydrological parameters. It can also help to monitor migrations of species which in some cases can be related to drinking-water sources.

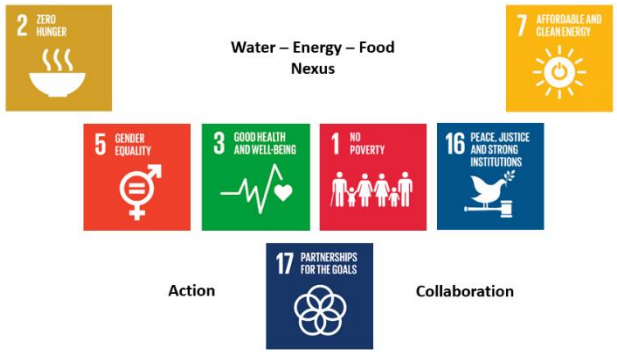
Figure 2
Selection of water-related SDGs and examples how space technologies can contribute to their achievement



Note: This list is not exhaustive.

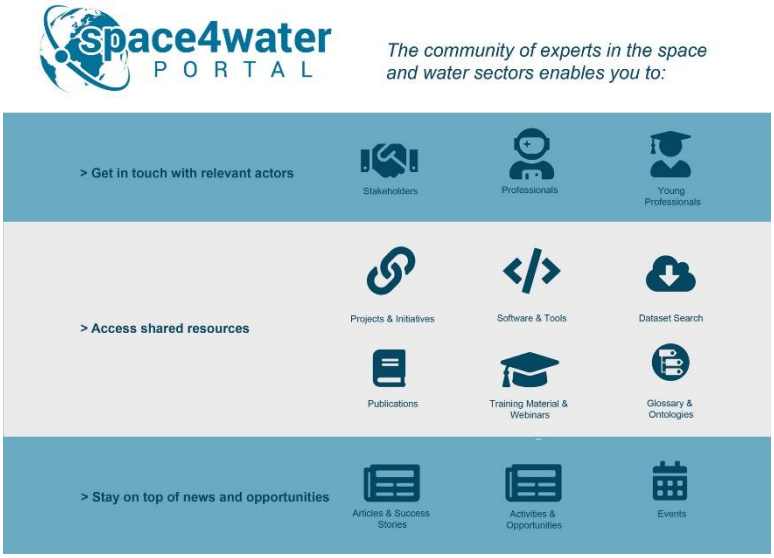
14. Water is intrinsically linked to SDG 2 – Zero Hunger and SDG 7 – Affordable and Clean Energy. It is a key element to end hunger and provides for a very clean form of energy. A trade-off has to be made to generate this clean energy and to protect ecosystems. 145 States have territory in one or more of the 263 transboundary lake and river basins. Many countries also share some of the 300 transboundary aquifers. Management of dams and controlling transboundary rivers can be a key element in achieving zero hunger as well as sustainable forms of energy. Space technologies can be an effective tool in monitoring these water bodies, and therefore an important source for informed decision-making, both within countries but also within transboundary water body commissions.

Figure 3
Water at a nexus



15. It is also noteworthy to mention that water relates to gender equality and health. By achieving water security, benefits will be seen in SDG 3 – Gender equality, because women and children bear the responsibilities of water collection in many areas of the world. It has to be an aim of the global community to reduce the 200 million hours women spend annually to collect water. Efforts to this end will benefit health of populations, access to education for girls, and in the long run, poverty reduction. Sustainable water resource management furthermore is a way to prevent future conflict over this precious and scarce resource.

16. The Office has published numerous articles and interviews with experts on the Space4Water Portal that describe space-based solutions contributing to all of the above-mentioned SDGs. Moreover, projects addressing water-related SDGs, as well as information on software for geo-data management and mapping are provided along with training material.



B. Value added by the Space4Water Portal

17. As a platform for interdisciplinary knowledge exchange, the Space4Water Portal brings together experts from the fields of both space technologies and water-related topics, to form a community of practice. On the Portal, organisations and actors share information on projects, initiatives, satellite missions, software, community and data portals, capacity-building and training material, conferences, workshops, as well as news and publications in the sector. This allows users to learn about successful applications of space technologies to address water management issues and provides contact details of professionals to learn more about any given topic.

18. A search function allows users of the Portal to access datasets, which are brokered from various data providers around the world, including Earth Observation and in-situ data. Searching for the term “water” results in over 135,000 datasets users can view or download.

19. The Office for Outer Space Affairs regularly publishes articles and success stories on the use of space technology to solve water-related issues, or to address relevant research questions.

20. Portraits of distinguished researchers, professionals, and role models in the space and water sector, are provided to the community. The Office interviews them and provides links to their work and publications. This is source of inspiration for younger practitioners and strengthens interpersonal relations within the community of practice.

21. The Office provides up-to-date information about events, opportunities, calls, training possibilities, webinars, and a glossary of important terms to inform the community.

22. The Portal serves as an entry point to space-based information for water researchers and practitioners who are not yet familiar with space technology. It offers knowledge about the space sector and serves as a hub for the dissemination of information.

23. The Space4Water Portal is intended to serve as a bridge between communities of both the water and space sectors, but also between different types of stakeholders:

academia, government, intergovernmental organization, private sector, private research institute, for non-profit organization, non-governmental organization. Individuals representing civil society are featured in the “Meet a Professional” and “Meet a Young Professional” section, or as author of articles and success stories.

24. There are many data portals on water implemented by the United Nations, its Member States, the private sector, or other stakeholders. Instead of replicating existing services, the Space4Water Portal links to existing resources and raises awareness of the vast number of projects and solutions provided by the community. Most importantly, the Space4Water Portal provides users a specific entry point to space-based solutions, which bring substantial added-value to water research and management. The Space4Portal is unique because it is the only portal that collects information on space-based solutions for all kinds of water related issues, in a holistic manner, instead of focusing on a specific water problem

C. The Portal in figures

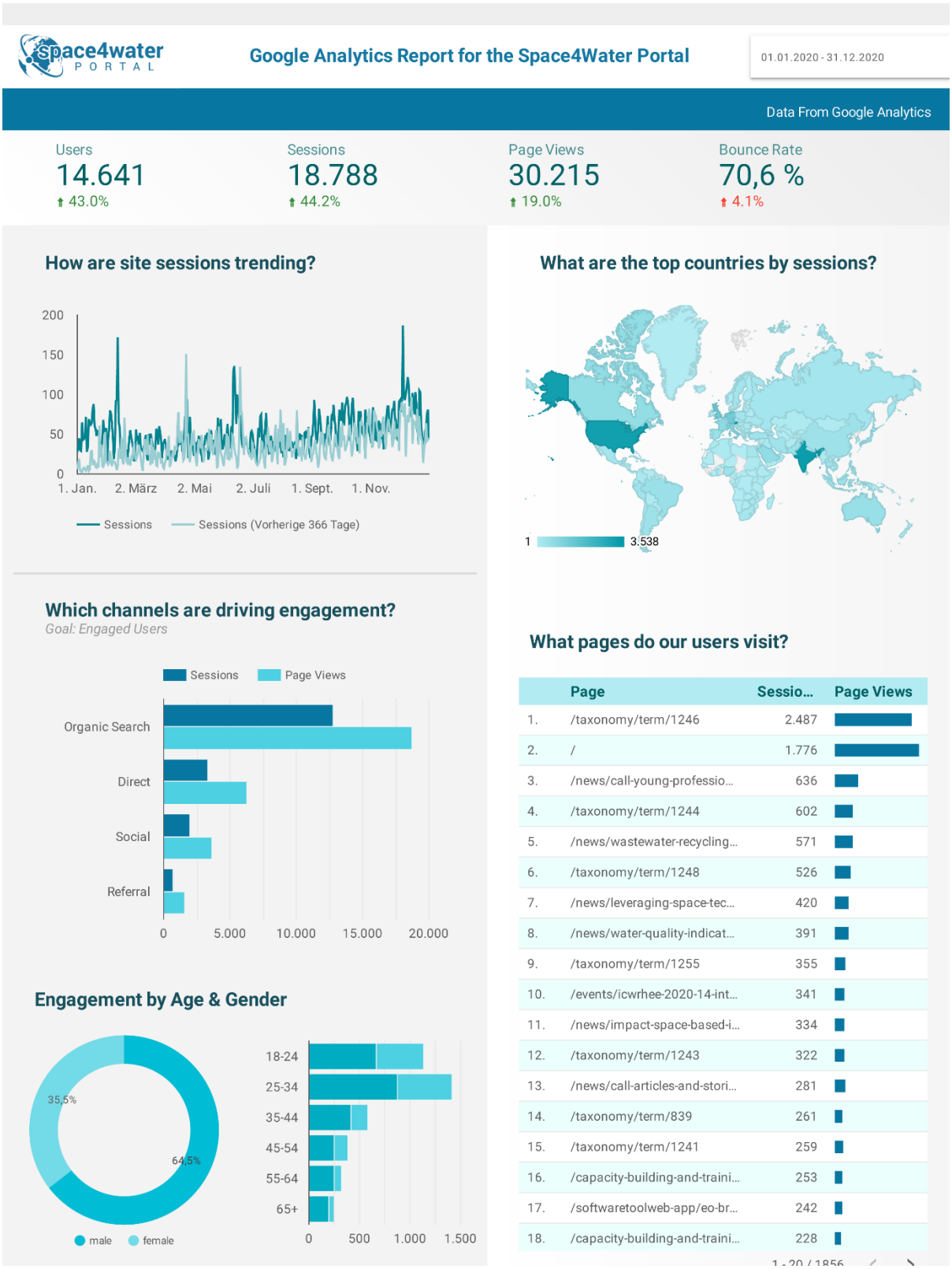
25. As of 31 December 2020, 48 stakeholders have registered to be featured on the Space4Water Portal, with many more currently evaluating their participation.

26. Distribution among types of stakeholders is as follows: Academia (10), Government (6), Intergovernmental organization (13), Non-for-profit organization (4), Non-governmental organization (3), Private sector and industry (5), Other (6).

27. The number of resources published on the Space4Water Portal as of 31 December 2020 are as follows: Software, Web apps, Tools (18), Programmes, Initiatives, Missions, Projects (10), Capacity-building and Training Material (33), Articles (22), Professionals’ Profiles (9), Young Professional’s Profiles (2), Interviews (10), Activities and Opportunities (10), Events (92), Publications (43), Glossary Terms (>600).

28. The Office analyses the usage statistics of the Space4Water Portal. In 2020, the Portal attracted over 14,000 users, who came from 175 countries (> 90 per cent of all United Nations Member States) and looked at over 30,000 pages. This is a rise by more than 43 per cent in terms of users, and over 20 per cent in terms of pages viewed. An example analysis of access statistics for 2020 can be seen in figure 4: Google Data Studio – Space4Water Analytics Report 2020.

Figure 4
Google Data Studio – Space4Water Analytics Report 2020



D. Inclusivity and diversity

29. The Portal strives to include all voices and a variety of contributions. That means being inclusive for people from all regions of the world, respecting and

mainstreaming gender equality as well as being inclusive of a broad range of users' age. The Portal provides tools suitable for different levels of technological advancement and financial resources, particularly tools that can be leveraged by actors from developing countries.

30. Geographical diversity is regularly monitored, to ensure a balanced representation of individuals. Sharing location information is not mandatory on the Portal, so statistics do not cover all the actors and initiatives featured. As of December 2020, the Portal had an unproportionally high representation of stakeholders from Europe. This could be due to a higher number of actors in the space sector in that region, or a higher number of actors in the water sector with the capacity to dedicate resources to public relations but could also be because the Portal has been presented during events organized in Europe that were mostly visited by Europeans. The Office seeks to balance the geographic diversity of stakeholders, and continues to invite all member States, and especially developing countries, to register on the Portal and share information on relevant stakeholders[3] in their country.

31. The Portal aims to foster women's empowerment and gender equality around the world, specifically in the space and water sector. To this aim, sections of the Space4Water Portal which feature individuals show a balanced representation. As of 31 December 2020, five women are featured out of eleven individuals in total. The Office has also establish knowledge exchange and mutually supporting activities with the Space4Women Project.

32. To be inclusive of all age groups and give generations of the future a voice, the Portal now includes the "Meet a Young Professional" feature, in which young individuals publish information about their professional activities. They are interviewed by the Office about their view of the space and water sector, the community, as well as key topics therein. The Office aims at knowledge exchange and joint activities with the Space4Youth Project.

E. Stakeholder feedback

33. In 2020, feedback of stakeholders has been gathered upon registration. When asked about key challenges in water management they highlighted the following:

(a) The water crisis (water quality and scarcity, growing demand, pollution of water sources) and the subsequent need to move from mismanagement of resources to well-informed, effective, and timely management at different governance levels based on evidence-based monitoring and assessment.

(b) Poor data management and challenges to provide real-time forecasts;

(c) The need to involve communities as well as society overall, raise public awareness of water management issues, leave no one behind (especially women, and people living in rural areas) and find standard ways to elevate community concerns for use in legal arbitration; and

(d) Building resilience, sustainable growth, and rural-urban links.

34. Stakeholders consider that space technologies and experts in this field can contribute to solve water-related issues, by:

(a) Visualizing water scarcity on large and small scales;

(b) Measuring and monitoring access to water, water point mapping, measuring failures of water points (pumps, etc.);

(c) Benefiting hydrologic monitoring;

[3] Interested potential stakeholders can apply online, to be considered as a Space4Water stakeholder.

(d) Providing alternatives to in-situ monitoring in large, remote and inaccessible regions;

(e) Providing corrections to model states;

(f) Monitoring changes in water availability, quality, water use, human responses to those, and implementing early warning systems, inter alia in support of water security at a global level;

(g) Contributing to water conversion and pollution control and building a water quality information services;

(h) Increasing evidence-based decision-making and supporting governance (in a cooperative manner);

(i) Developing solutions based on collaboration of people from different sectors and geographical regions to take better decisions, considering regional specifics;

(j) Standardizing EO analysis for use in legal forums (international courts, arbitration);

(k) Raising awareness of the potential of space technologies for water management overall; and of groundwater, which poses a necessity to be looked at from a global perspective.

35. Stakeholder feedback is valuable input to improve the Space4Water Project and will continue to be sought to orient future initiatives towards better serving user needs.

III. Outlook – project continuity and future plans

36. With renewed financial support from PSIPW for the next six years, the project will be based on the above mentioned three pillars (see Section II para. 6), which are each addressed in the sections below.

A. The Portal

37. User and stakeholder demand for new features will be regularly assessed by the Office and the most important ones will be developed.

38. To facilitate a Regional Focus, which serves as an entry point for data of the portal, alternative views and filters could be added according to e.g. climate regions, or regions defined by other criteria, to filter content and solutions based on similar regional or climate constraints. At the moment, borders of countries and continents define the regional limits.

39. Apart from constant development of new features and keeping technology up to date, the Office considers implementing the following in the coming years:

(a) A newsletter;

(b) Increased opportunities to interact online with the community, e.g. finding potential collaborators based on their favoured areas for cooperation or collaboration;

(c) Better and more fine-grained filter possibilities on existing content pages;

(d) More coverage of calls and opportunities; and

(e) Sharing of regional perspectives or case studies by people living in or researching specific regions/areas affected by certain practices related to water management.

40. Potential areas of expansion cover features to foster knowledge exchange, such as mapping of gaps and solutions and access to an Automatic Programming Interface

(API) to improve automated data exchange with stakeholders, who have many resources to share.

41. The survey of stakeholders in 2020 shows that there is interest in additional features, such as:

(a) Best practices/models/case studies that show how to monitor and measure access to water efficiently, with the latest research;

(b) Gender equality around space technology supported water management;

(c) Collaboration mechanisms/tools for direct exchange of knowledge and data; possibilities to search more easily for collaborators;

(d) Listing opportunities for funding (that can bring together collaborators);

(e) A community question board.

B. The Community of Practice

42. Apart from the conference series or capacity building initiatives by UN-SPIDER (e.g. on flood mapping), most activities related to Space Technologies and Water Resource Management have taken place online.

43. The Office sees value in the creation of a real community of practice to exchange on latest research findings, to inform decision-making and governance with scientific knowledge and to provide for a platform between all stakeholder groups (international intergovernmental organisations, government, academia, private sector and industry, civil society).

44. It would be valuable to organise stakeholder meetings at which the stakeholders of the Space4Water Portal can meet in person after travel restrictions due to the COVID-19 pandemic have been released. A few participants from developing countries could receive fellowships to participate in such meetings, to allow for a more balanced attendance from various world regions.

IV. Conclusion

45. During the past three years, the Space4Water Portal has created and shared valuable resources and a community of practice has started to develop around the theme of Space4Water.

46. Researchers and Professionals see value in the Space4Water initiative and have provided feedback on what potential solutions space technologies can provide, as well as on how they see Space4Water contributing to addressing current issues.

47. Numerous stakeholders have registered to be part of the community and shared information on their resources. As this can be a time-consuming task, considering the often-limited human resources, their willingness to contribute demonstrates the value they see in the initiative.

48. User access statistics show that the initiative is growing rapidly.

49. In the future, the project will allow face-to-face interaction and knowledge exchange during stakeholder meetings, provide new ways to increase online interaction among the community, and continue to develop innovative features for the portal with guidance to contributors. The Office aims to distribute the first newsletter mid-2021.

50. As a hub of information and knowledge, this portal lives from contributions of relevant stakeholders and individual professionals. The Office encourages all Member States and affiliated parties of the Committee on the Peaceful Uses of Outer Space to promote the portal among relevant actors.

51. The Office also welcomes individual professionals to engage with the portal and to provide their valuable views and ideas.

52. The experience gained by running the Space4Water Portal and interactions the Office developed with its users is already serving to develop other services at the Office for Outer Space Affairs in areas directly or indirectly connected, such as Space4Youth and Space4Women.