



International Partnership Programme

# Development from Space: A Summary of the IPP Midline Evaluation

July 2020





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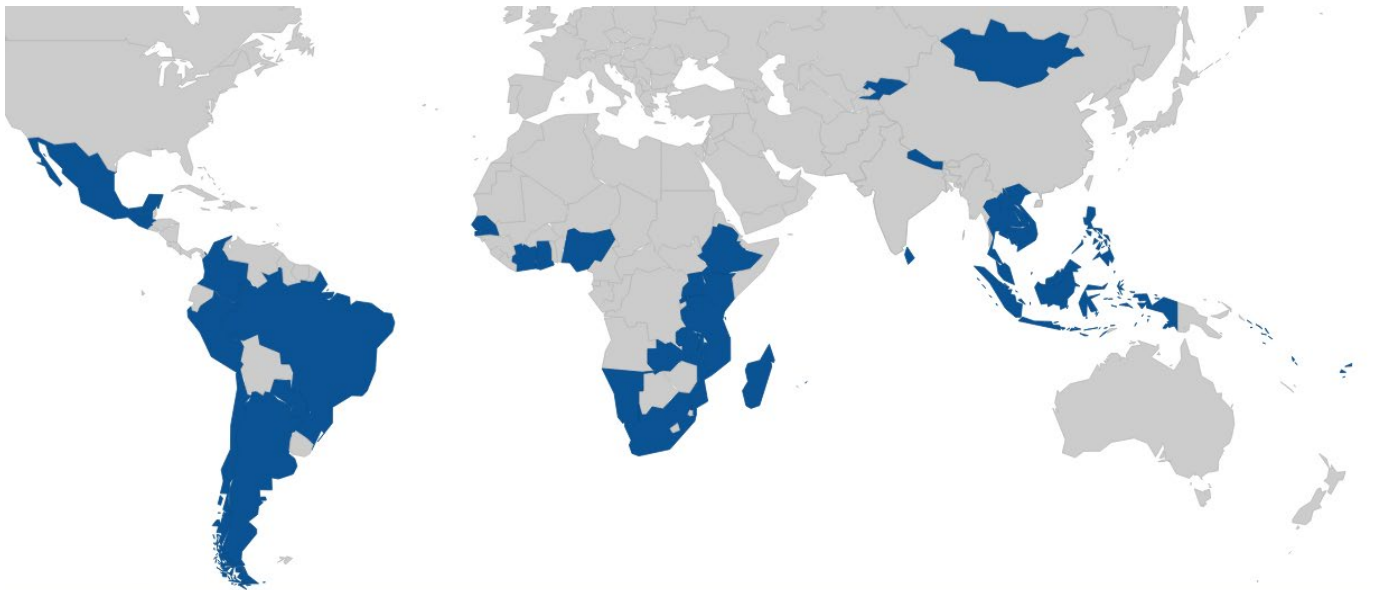


# Introduction

The International Partnership Programme (IPP)<sup>1</sup> is a five year, £30 million per year programme run by the UK Space Agency (UKSA). IPP uses the UK Space sector's research and innovation strengths to deliver a sustainable economic, societal or environmental benefit to developing economies. IPP is funded from the Department for Business, Energy & Industrial Strategy (BEIS) Global Challenges Research Fund (GCRF).<sup>2</sup>

IPP's ultimate objective is to have a measurable and sustainable economic or social impact on the UN Sustainable Development Goals (SDGs) by 2021.<sup>3</sup> It provides grant funding to projects that apply space technology and data to development. By developing new solutions, coupled with capacity development in partner countries, IPP projects are enabling stakeholders in developing countries to use satellites to find new and innovative ways to tackle development challenges in 44 countries around the world.

Figure 1: IPP Project Locations<sup>4</sup>



IPP projects have a direct, measurable impact on ten UN SDGs, with the most commonly targeted sectors being disaster resilience, agriculture and deforestation/land management.

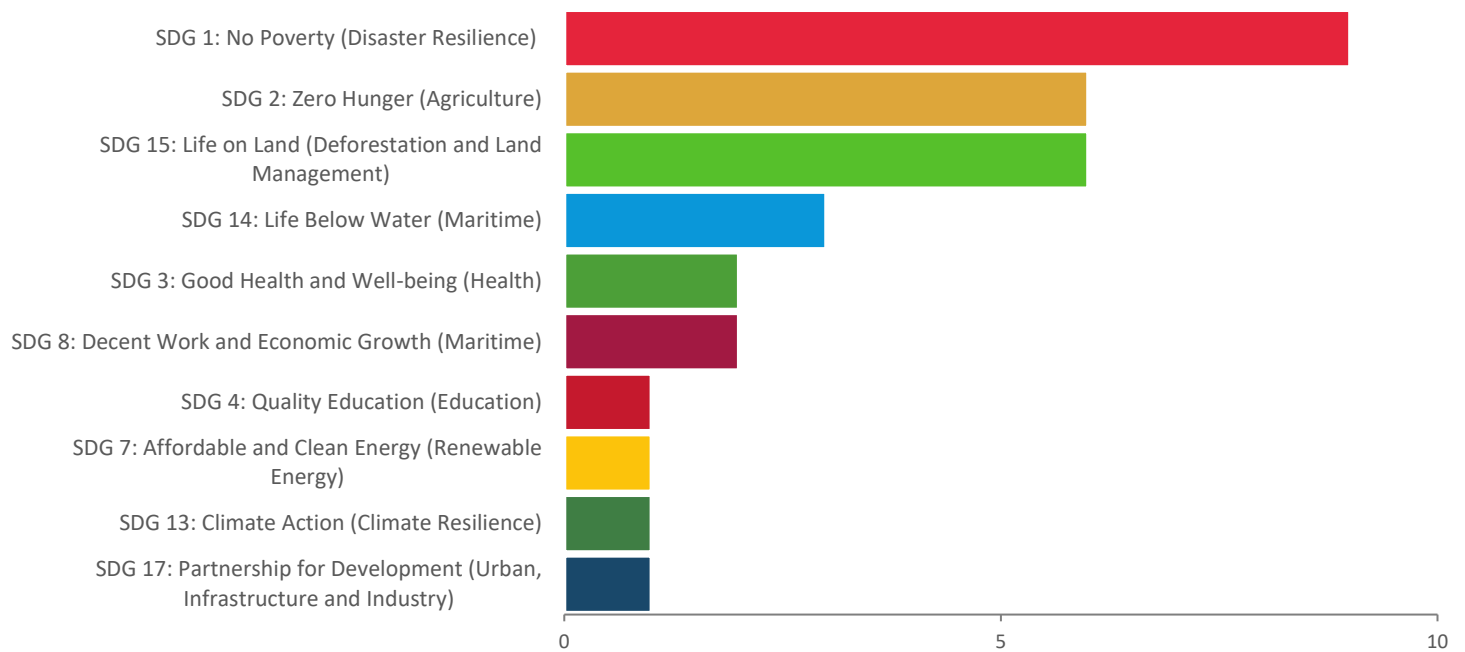
<sup>1</sup> UK Space Agency. 'International Partnership Programme'. <https://www.gov.uk/government/collections/international-partnership-programme>.

<sup>2</sup> UK Research and Innovation. 'Global Challenges Research Fund'. <https://www.ukri.org/research/global-challenges-research-fund/>. Accessed February 2020.

<sup>3</sup> UN. 'Sustainable Development Goals (SDGs)'. <http://sustainabledevelopment.un.org/sdgs>. Accessed February 2020. The SDGs are a set of 17 global goals established by the UN General Assembly to be achieved by 2030. All UN member states have agreed to work towards achieving these goals. They recognise that ending poverty and other deprivations must go hand in hand with strategies that improve health and education, reduce inequality and spur economic growth while tackling climate change and working to preserve the world's oceans and forests.

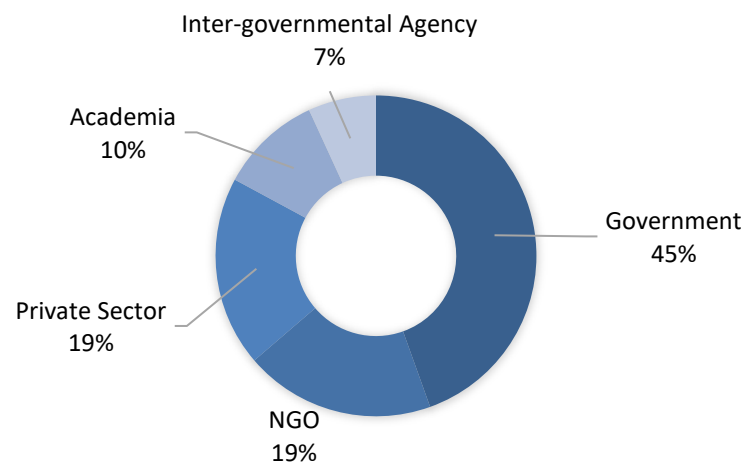
<sup>4</sup> Caribou Space. 'IPP Programme Midline Evaluation'. January 2020.

Figure 2: UN SDGs Targeted by IPP Projects<sup>5</sup>



In December 2019, IPP completed three and a half years of implementation. As its name suggests, international partnerships are a core element of IPP, and thus far across 33 projects, IPP has supported partnerships between 122 (predominantly) UK-based organisations and 152 organisations in developing countries. The vast majority of these international partners are government ministries, followed by non-governmental organisations (NGOs) and the private sector, as the end users of IPP derived solutions.

Figure 3: International Partner Types<sup>6</sup>



<sup>5</sup> Caribou Space. 'IPP Programme Midline Evaluation'. January 2020.

<sup>6</sup> As above.

# IPP Results to Date



## SDG 1: No Poverty (Disaster Resilience)

IPP tools from ten projects have been applied to over a dozen natural disaster situations including volcanic eruptions,<sup>7</sup> typhoons,<sup>8</sup> and even evacuation centres set up to cope with population displacement due to armed conflicts.<sup>9</sup>

The **Earth and Sea Observation System (EASOS)**, led by the **Satellite Applications Catapult** working with UK flood specialist Ambiental, developed EASOS Flood Watch. This was used in Malaysia during the 2017-18 disaster season to predict and model floods by providing actionable intelligence for operational management of flood events. Guided by information provided via EASOS Flood Watch Lite, a street by street plan was developed for clean-up, inspection and repair of key infrastructure, return to home and security against looting. In one instance, following flooding, EASOS supported a clean-up and safe return home plan for 7,000 displaced people by providing street by street risk information.<sup>10</sup>

The IPP-funded **Inmarsat Philippines project's satellite communications (SatComms) tools** have contributed in a diverse range of situations, from family tracing in disaster aftermath scenarios to facilitating identification of recovered bodies of landslide victims and even the rescue of a human trafficking victim (who was found in Palawan and connected to her parents in Vietnam through satellite phone).<sup>11</sup>



**Actionable Intelligence  
Delivered for >12 Disaster  
Events**

<sup>7</sup> Astrosat. 'FMAP Monthly Update Project Report'. June 2018.

<sup>8</sup> Astrosat. 'RAPID Midline Report V1.2'. January 2018.

<sup>9</sup> Inmarsat. 'Endline Evaluation Report Philippines DRR Project'. April 2019.

<sup>10</sup> Satellite Applications Catapult. 'EASOS Early Impact ('Quick Wins') Report'. May 2018.

<sup>11</sup> Inmarsat. 'Endline Evaluation Report Philippines DRR Project'. April 2019.

## 2 ZERO HUNGER



### SDG 2: Zero Hunger (Agriculture)

Across **seven agriculture-related projects**, tools are being developed that either directly engage farmers or provide information to intermediaries such as agronomists, NGOs and meteorology departments. While many of the decision support tools are only just starting to be rolled out, over 47,000 farmers have already been directly engaged in IPP to map field boundaries, test decision support tools and begin implementing agronomic advice.<sup>12</sup> This is almost as many

farmers as there are in the whole of Wales.

Through the **Centre for Agriculture and Bioscience International (CABI) Pest Risk Information Service (PRISE) project**, at least 1,350 farmers have indirectly received information from plant doctors about pests and diseases through plant clinics, cooperatives and other informal and formal village meetings.<sup>13</sup> One extension officer/plant doctor in the Kafue district in Zambia stated that "generally, the alerts were useful to farmers and [those] who followed the right management options available for the pests and used proper inputs (e.g. top dressing fertilisers), their crops were not highly affected [by the pest outbreak]".<sup>14</sup> Across maize and bean crops in Kenya, farmers receiving alerts are experiencing lower average losses than those who are not.<sup>15</sup>

The **Rezatec-led COMPASS project** has completed its first full trials on wheat harvests in Mexico and has found that recommendations from the system specifically focused on irrigation can increase wheat yields by up to ten percent.<sup>16</sup>

The **ACCORD project, led by Earth-i**, has begun a messaging service for coffee farmers, 94% of whom are reporting taking the actions recommended by the messaging service.<sup>17</sup> The impacts of these messages on yields and farmer incomes should become visible in the first half of 2020.



**47,000  
Farmers**

<sup>12</sup> Earth-i. 'ACCORD Monthly Update Project Report'. November 2019; Rezatec. 'IPP Mexican COMPASS: Midline Evaluation Report'. 13 February 2019.

<sup>13</sup> CABI. 'PRISE pest alerts providing early warning to farmers on pests' outbreaks: A snapshot case study for Zambia'. August 2018; CABI. 'PRISE: Logframe FINAL\_150219'. February 2019.

<sup>14</sup> CABI. 'PRISE Zambia Case Study'. December 2018.

<sup>15</sup> CABI. 'PRISE: Pest Risk Information Service: Quarterly Project Meeting - Q3 2019'. September 2019.

<sup>16</sup> Rezatec. 'IPP Mexican COMPASS: Midline Evaluation Report, Update'. September 2019.

<sup>17</sup> Earth-i. 'ACCORD Quarterly Review'. November 2019.

### 3 GOOD HEALTH AND WELL-BEING



## SDG 3: Good Health and Well-being (Health)

IPP has funded two projects<sup>18</sup> addressing health and well-being. **The Inmarsat Nigeria project, Utilising E-health Solutions through SatComms Technology**, has provided video training for 341 health workers in remote areas. 75% of these have attained at least a 60% pass rate. When interviewed, there was consensus among policymakers, facility heads and frontline health

workers that watching instructional videos has empowered health workers to provide life-saving care to pregnant women and their infants. An estimated 30 lives have been saved across three states where health workers regularly view videos supplied by the project.

According to one health worker in Ondo State, "watching the videos...I have been able to identify different conditions that can affect infants like sepsis...and concerning pregnant women, I also learned about [how to manage] post-birth haemorrhage [sic] i.e. bleeding after birth."<sup>19</sup>



### 4 QUALITY EDUCATION



## SDG 4: Quality Education (Education)

The **Avanti iKnowledge project** in Tanzania is the only IPP project focused on education and satellite connectivity.

In 312 schools connected, 96% of students reported at endline that they saw an increased use of Information

and Communications Technology (ICT) in their classrooms.<sup>20</sup> In an evaluation conducted six months after project close, teacher satisfaction had dropped slightly (as continued training and equipment maintenance from the project stopped), as had students reporting usage of ICT in their learning (down by three percent).<sup>21</sup>



**574  
Teachers**

**34,000  
Students**

<sup>18</sup> The HR Wallingford led DMOSS project is not reported on as the tool is still in active development.

<sup>19</sup> Inmarsat Nigeria. 'Report of endline assessment for extending Nigerian health services to rural populations using Satcoms'. June 2019.

<sup>20</sup> Ace Africa. 'iKnowledge (Tanzania): End line Monitoring and Evaluation Report for Phase 1 and Phase 2 Schools'. Avanti Communications Ltd. October 2018.

<sup>21</sup> Ace Africa. 'iKnowledge (Tanzania): Monitoring and Evaluation Legacy Report for Phase 1 and Phase 2 Schools'. Avanti Communications. July 2019.



## 7 AFFORDABLE AND CLEAN ENERGY

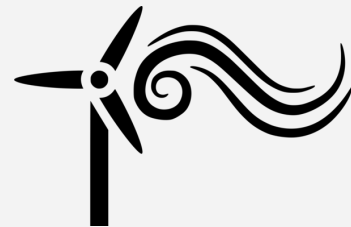


### SDG 7: Affordable and Clean Energy (Renewable Energy)

**Renewable Energy Space Analytics Tool (RE-SAT)**, IPP's only renewable energy project (led by the **Institute for Environmental Analytics**), has launched renewable energy analytics platform prototypes for four Small Island Developing States (SIDS). The government of the Seychelles is now actively using the platform to model scenarios for how the country will reach its target of 15% renewable energy by 2030.

The Government of Palau has used RE-SAT data to provide supporting information on energy production for a bi-lateral grant proposal with the Italian government to install solar Photovoltaic lights at boat ports. In Montserrat, it will be used to conduct a wind assessment study to determine which areas are most suitable for wind farms. In Mauritius it will be used to identify the best locations for solar and wind projects.

2020 will see further roll out of the platforms, including launches with a further three SIDS.



## 8 DECENT WORK AND ECONOMIC GROWTH



### SDG 8: Decent Work and Economic Growth (Maritime)

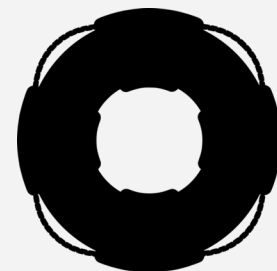
IPP has funded **two projects that support the safety of lives at sea** and almost 1,000 small fishing boats have already been equipped with vessel tracking devices.<sup>22</sup> However, substantially fewer units are being regularly 'switched on'.<sup>23</sup>

Both projects have benefited small-scale fishermen in active search and rescue operations<sup>24</sup> and by enabling them to avoid accidents at sea (for example, by providing their location to larger vessels which then can avoid them).

IPP-funded equipment had been used in six rescue missions which saved 45 fishermen.<sup>25</sup> These rescues included: boats lost in fog, vessels disabled by mechanical failure, and a medical emergency.<sup>26</sup>

Based on average crew sizes where these projects are being implemented, it is estimated that IPP could directly benefit around 6,635 fishermen and indirectly benefit almost 25,000 people in fishing households.<sup>27</sup>

**986 Boats**



**45 Lives**

<sup>22</sup> exactEarth Europe. 'South Africa Safety Initiative for Small vessels operational Take-Up (OASIS -TU) Final Report'. 29 March 2019; Inmarsat. 'Indonesia Project Performance Review Report 5'. March 2019.

<sup>23</sup> exactEarth Europe. 'OASIS-TU GCN03 October 2019 MPR'. October 2019.

<sup>24</sup> exactEarth Europe. 'Midline Project Evaluation'. November 2018.

<sup>25</sup> Inmarsat. 'Mid of Pilot Impact Assessment'. October 2018.

<sup>26</sup> As above.

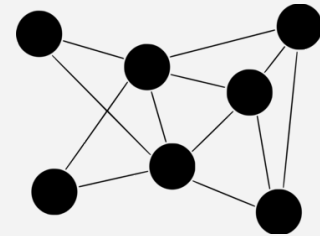
<sup>27</sup> exactEarth Europe. 'Final Report: Annex D Logframe.' 22 March 2019; Inmarsat. 'Indonesia Project Performance Review Report 5'. March 2019; Calculations of indirect beneficiaries are based on average household sizes provided by <https://population.un.org/Household/index.html#>. Accessed April 2019.

## 13 CLIMATE ACTION



### SDG 13: Climate Action

Many IPP projects relate to climate change and its impacts, however the **UNITAR CommonSensing project** is primarily focused on building capacity for climate resilience in SIDS, directly addressing issues of capacity, financing and action for SIDS. While the project's Earth observation (EO) derived services are yet to be developed, a network of national experts on climate finance and capacity building has been put in place to support these countries in accessing more global climate funds.



## 14 LIFE BELOW WATER

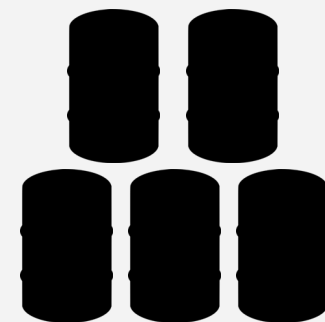


### SDG 14: Life Below Water (Maritime)

This SDG focuses on the conservation and sustainable use of marine resources on both illegal, unreported and unregulated (IUU) fishing and marine pollution all of which are a concern to IPP and are addressed in two projects.

To date, in the **Indonesia Inmarsat project**, there has been only a single incidence of a boat from the pilot fleet reporting an IUU event. This is likely to reflect the high compliance levels of these relatively small vessels in territorial waters or it may be due to the anticipated difficulties in detecting and reporting on IUU behaviour. However, project monitoring is revealing other benefits. Overall, fishers equipped with vessel monitoring showed an increase in their income from two to five percent (compared to control groups), however in one quarter, satellite-enabled fleets made as much as 35% more gross margin than control fleets (£65.92 or IDR 1.32 million) per trip. These vessels also used 32% less fuel than the control boats, indicating some advantage from the use of vessel monitoring to find fish.

Regarding marine pollution, **EASOS Marine Watch** has been instrumental in three maritime accidents. In June 2017, the system helped prevent a 19km<sup>2</sup> oil slick from reaching the coastline, resulting in estimated savings of clean-up costs of £1.5 million. In April 2019, approximately 27m<sup>3</sup> of marine oil made landfall in Malaysia. EASOS was used to model historic movement of the slick and to identify vessels in the area of the slick when it originally appeared; this will support the prosecution of a potential culprit.<sup>28</sup> In addition, in May 2019, EASOS Marine Watch detected a 4.9km<sup>2</sup> oil slick and informed the Malaysian authorities. They were able to keep the spill from reaching coastline, resulting in an estimated cost saving of £1.6 million.<sup>29</sup>



**Over 50,000 Barrels  
of Oil Intercepted**

<sup>28</sup> LTS International. 'EASOS: Initial Evaluation'. May 2019.

<sup>29</sup> EASOS. 'Oil Spill Impact Analysis'. June 2019.



## SDG 15: Life on Land (Deforestation and Land Management)

IPP has funded **six projects on forestry and land management** which are providing tools to support improved forest governance. When applied, these are expected to ultimately slow deforestation rates in project regions by providing local forest authorities with actionable intelligence. To date, an estimated 40 million hectares of forests are already being monitored using IPP-funded EO solutions (an area equivalent to all the forests in the UK, France, Spain and Switzerland combined) and an estimated one million hectares (more than five times the size of London) of deforestation has been avoided.<sup>30</sup>

In addition to this, in Peru a large driver of deforestation is landlessness and small farmers who cut down areas of forest illegally to farm. Using IPP-developed tools, the regional government of San Martin has now issued 14 land titles to smallholders to provide them with their own land to farm and intend to use the tool to issue thousands more in the future.



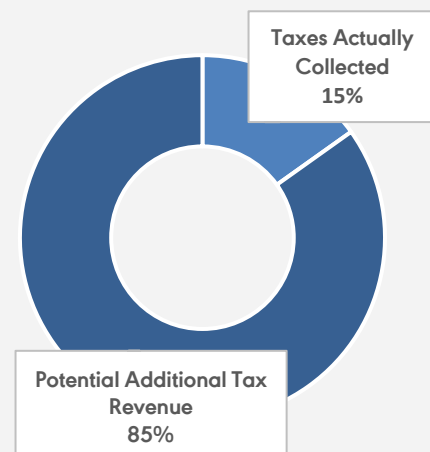
**40 Million  
Hectares**



## SDG 17: Partnership for Development (Tax)

The one IPP project contributing to this SDG, **Airbus's Property Database for Dakar**, was completed in early 2019 as a successful demonstration of the potential of satellite technology to map building change to improve land administration and taxation.

Research suggests that only 19% of property owners pay property tax in Dakar, Senegal, and that these rates are not based on up-to-date information about the size and condition of dwellings in the city. During the project's trial period, Airbus found that property tax collection could grow from the approximately £10 million actually collected to £66 million per year.<sup>31</sup> Property tax collection in Africa represents less than 0.5% of GDP compared with around 1.8% across the Organisation for Economic Co-operation and Development (OECD) and 4% in the UK.<sup>32</sup> Because of this, it is widely believed that tools to support improved property tax systems such as that developed by Airbus could be a significant resource for governments to enable investments in transportation, sewage infrastructure, health, education and other areas.



<sup>30</sup> Vivid Economics. 'Midline Report for Deforestation prevention from land use monitoring and valuation in Cote d'Ivoire'. November 2018; Vivid Economics. 'Midline Report for Remote mapping and socio-economic valuation tools to support planning and implementation in land use interventions in Peru'. March 2019; Ecometrica. 'IPP Forests2020: Annex 1 Updated Logframe Version 62'. December 2019

<sup>31</sup> €76 million according to original calculations. Airbus Defence & Space. 'Satellite Image Analysis for Operational Maintenance of a Property Database for Dakar City, Senegal: M&E Endline Evaluation Report Version 1.0'. January 2019.

<sup>32</sup> Caribou Digital. 'International Partnerships Programme: Baseline Evaluation Version 2.5'. January 2019.

## Lessons Learned

While IPP has been successful in beginning to achieve results and impacting the UN SDGs, it has also learned a great deal about *how* to develop and implement international projects that intersect the space and sustainable development sectors.

IPP has a goal to ensure the impacts of projects funded continue after the UKSA grant funding ends. That requires international partners to have sufficient capacity to continue to manage the projects post IPP funding, projects to be designed in a way that supports sustainability, and for there to be sufficient financing for continued access to, or expansion of, equipment, services or platforms provided within IPP.

## Financial Sustainability

At midline, most projects have not yet secured sustained, post-IPP funding to ensure they can continue their project outcomes and impacts over the long term. This is taking more time than initially expected, however projects are optimistic that they will be successful. Major lessons they have learned include:

- **end users are reluctant to commit funding without seeing a robust and workable product they can test and ask questions about.** While solutions are still in development, products remain abstract and it is hard to answer customer questions concretely.
- when systems are only used during particular times of year (e.g. during a disaster event or season, a crop irrigation window, etc.) it can **take several years to build up a solid trust basis, or value for money evidence, with end users.**
- **decision making is a slow, and often influenced by non-transparent, political process.** Projects may lack a detailed understanding of power dynamics in the decision-making process.
- **projects have not always sufficiently considered sustainability early enough in their implementation.** Given the length of time it takes to prepare post-grant financing in practice, many projects have been slow to build this into their plans.

To date about one-third of IPP projects are engaged in advanced negotiations or tenders to provide their IPP-derived products and services (or elements of them) to stakeholders in developing countries.

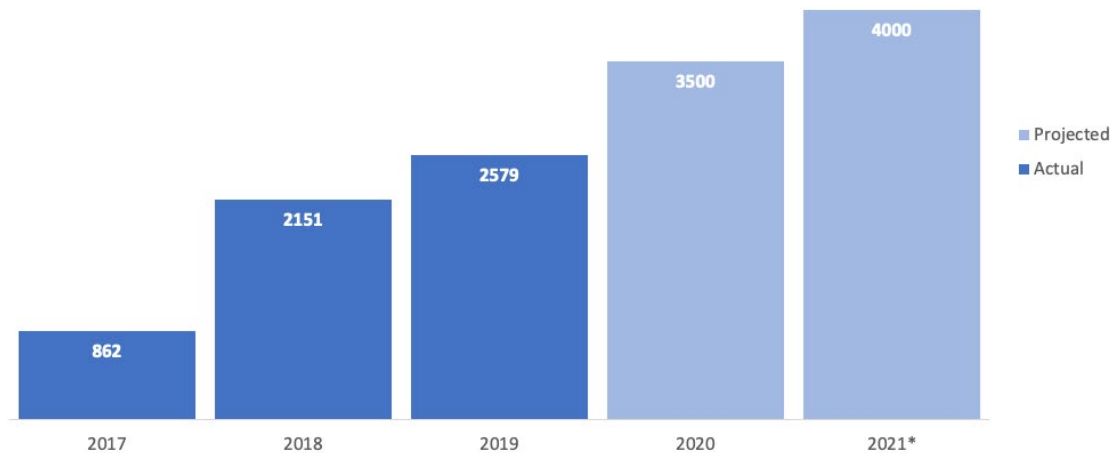
## Capacity Development

The importance of capacity development in IPP cannot be stressed enough. At a basic level, it is a vital step in helping end users to understand the potential uses of satellite-enabled solutions and to help understand why a particular service is necessary and why this is an efficient way to solve their problems. At a more technical level, it is the missing piece that allows in-country stakeholders to use the solutions developed independently, sustainably, and efficiently. In-country partners are potentially able to maintain and even further develop tools to meet their own needs in a self-sufficient manner with the right types of capacity development.

To date, IPP has trained approximately 2,600 individuals in partner countries on the use of satellite-enabled solutions.



Figure 4: Actual and Projected Number of Individuals with Increased Capacity to use Satellite-enabled Solutions due to IPP.<sup>33</sup>



Almost one-third of these are estimated to be women. It has also provided funding for five PhD student placements, 2 Masters students and engaged 11 undergraduate students in research activities.

However, IPP projects have learned that more work needs to be done on baseline individual and organisational capacities within each project to understand project starting points, and plan for an effective skills transfer process (that takes into account basic and associated skills that may be needed to support the implementation of new technology). Many projects have underestimated this process so far and thus planned capacity development around limited methodologies of formal training and workshops. Where projects have implemented comprehensive capacity development plans, it has allowed for more tailored and relevant capacity development with partners.

IPP has 14 multi-country projects, several of which have benefited from cross-cultural (South-South) learning. These projects have arranged exchanges, learning events, secondments and communities of practice between partners in developing countries with a significant degree of satisfaction and success from the perspective of the partners.

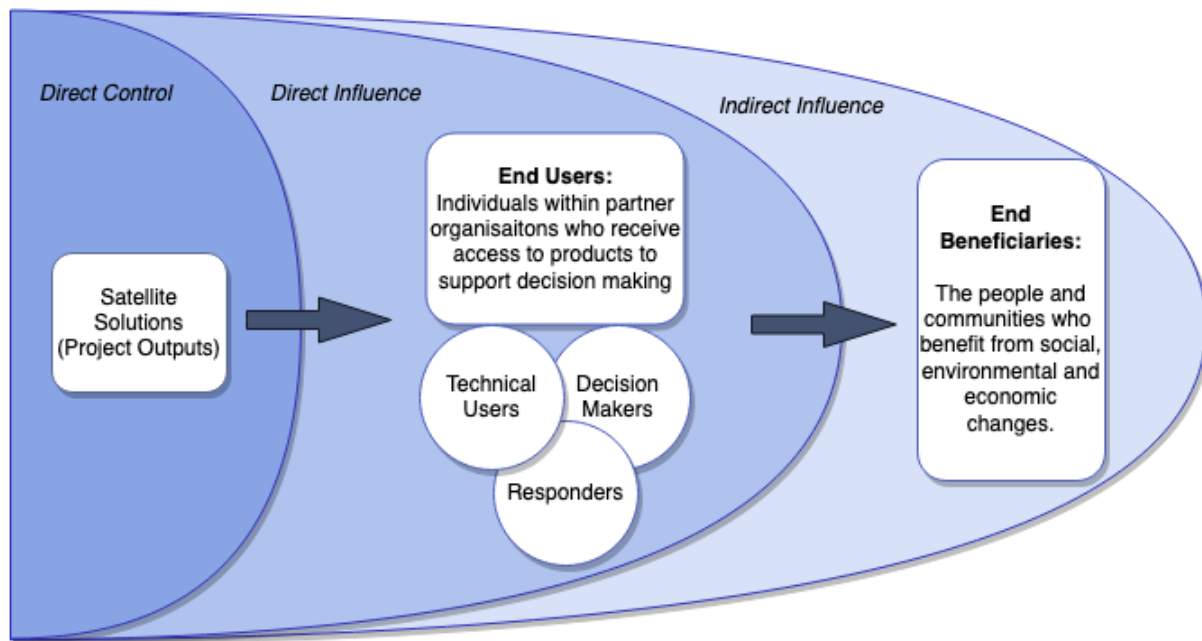
## Transforming Capacity into Practice

While capacity development is obviously important to IPP, it is also important for projects to ensure the systems that they are developing are incorporated into the operational processes of end user organisations. This organisational adaptation is often outside a project's sphere of direct control (see Figure 5), and thus left to end users to manage. However, it is a crucial step in ensuring that projects have a lasting impact on end beneficiaries. Getting pilot projects beyond the point of trials and embedded into ways of working has been a struggle for the development sector for decades, and IPP is not unique in this

<sup>33</sup> Caribou Space analysis of IPP project Logframe data. 2021 will cover results only for Q1, as IPP is set to end in March 2021, and so has a lower projected result than other years.

regard. Influencing behavioural change is a long process and is often outside the technical areas of specialism of UK partners.

Figure 5: IPP Project Spheres of Influence and Stakeholders



## Partnerships

Meaningful partnerships are based on a recognition of mutual benefit through working and learning together, and active engagement throughout the project. While having the right partners helps open doors in-country, when partnerships are reduced to sporadic engagement and consultation – a 'tick box' exercise – it misses the potential benefits each partner brings to the project.

One of the major possible improvements to partnerships in IPP will be to ensure that all projects have a deep understanding of the countries, stakeholders and power dynamics in the sectors where they will be working. IPP has already instated a multi-phase approach to project implementation through its latest third call, including a Discovery Phase, to encourage more co-design and context mapping. This will also allow projects to define specific contributions and responsibilities for each partner that can be monitored and reported on.

Projects have also found that once projects are being implemented, regular engagement (rather than short bursts of activity) is essential. Many have also found that having a physical presence in-country – either a strong local partner, or a dedicated project manager – who can champion the project, engage end users and oversee all local engagement, is crucial. In some cases, projects have had to play the unexpected role of convening partners who often do not work together and had to plan time and opportunities to bring those stakeholders together.

## Conclusions

At Programme midpoint, IPP outputs are showing significant progress, and are beginning to lead to some short-term outcomes – particularly related to capacity building, and sharing examples of how space can contribute to resolving the UN SDGs. Importantly, IPP projects are also forecast to deliver their impacts more cost-effectively than other (non-space) methods (see Table 1).

Table 1: Cost Effectiveness of Space-Enabled Solutions When Compared to Non-Space Alternatives<sup>34</sup>

	Short Term	Long Term	Alternatives	Long-Term Average Cost Savings
<b>Forestry</b>	x8 times more efficient	x11.8 times more efficient	Aerial photography, drones and foot patrols	£12.8 per hectare of deforestation avoided
<b>Agriculture</b>	x6 times more efficient	x6.7 times more efficient	Drones, foot patrols, extension workers	£0.05 per £1 of additional crop yield gained
<b>Disaster Resilience</b>	x1.7 times more efficient	x1.8 times more efficient	N/A <sup>35</sup>	£20,000 per person killed missing or injured

IPP is also generally on track to deliver the outcomes and impacts it was expected to achieve, and has generated learning about how a space for development programme of this size and scope can be delivered. At this time, projects are now handing over more tools and systems to international partners, and encouraging their use and piloting towards the objective of contributing to the UN SDGs. While modifications can be made within the Programme to improve its implementation, IPP is expected to have a demonstrable impact on how space technology is used for development in the future.

<sup>34</sup> London Economics and Caribou Space. 'Economic evaluation of the International Partnership Programme (IPP): Cost-effectiveness Analysis'. [www.spacefordevelopment.org/wp-content/uploads/2019/10/UKSA-IPP-Cost-Effectiveness-Analysis-FINAL-for-web-1.pdf](http://www.spacefordevelopment.org/wp-content/uploads/2019/10/UKSA-IPP-Cost-Effectiveness-Analysis-FINAL-for-web-1.pdf). Accessed February 2020.

<sup>35</sup> For disaster resilience, alternatives vary widely across different types of projects and thus can't be summarised in this table.



## Glossary

**ACCORD** - Advanced Coffee Crop Optimisation for Rural Development

**BEIS** - Department for Business, Energy & Industrial Strategy

**CABI** - Centre for Agriculture and Bioscience International

**COMPASS** - Crop Observation, Management & Production Analysis Services System

**EASOS** - Earth and Sea Observation System

**EO** - Earth observation

**GCRF** - Global Challenges Research Fund

**GDP** - Gross Domestic Product

**IPP** - International Partnership Programme

**IUU** - Illegal, Unregulated and Unreported fishing

**M&E** - Monitoring and Evaluation

**NGO** - Non-Governmental Organisation

**ODA** - Official Development Assistance

**OECD** - The Organisation for Economic Co-operation and Development

**PRISE** - Pest Risk Information Service

**RE-SAT** - Renewable Energy Space Analytics Tool

**SatComms** - Satellite Communications

**SDGs** - Sustainable Development Goals

**SIDS** - Small Island Developing States

**UK** - United Kingdom

**UKSA** - United Kingdom Space Agency







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At the heart of UK efforts to explore and benefit from space, we are responsible for ensuring that the UK retains and grows a strategic capability in space-based systems, technologies, science and applications. We lead the UK's civil space programme in order to win sustainable economic growth, secure new scientific knowledge and provide benefit to all citizens.

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