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Partner Country Case Study: Peru

Final Evaluation of The Newton Fund

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Abbreviations

AH	Award Holder
AHRC	Arts and Humanities Research Council
AMPA	Amazónicos por la Amazonia
ANA	Water National Authority of Peru
ANEPSSA	The National Association of Water Utility and Sanitation Entities of Peru
BBSRC	Biotechnology and Biological Sciences Research Council
BEIS	Department for Business, Energy and Industrial Strategy
CENAN	National Centre of Nutrition and Food
CITEs	Technological Innovation Centres
CONCYTEC	National Council for Science, Technology and Technological Innovation
CONDESAN	Consortium for the Sustainable Development of the Andean Ecoregion
COURCYTEC	Regional Science, Technology, and Innovation Councils
CSSP	Climate Science for Service Partnership
DARA	Development in Africa with Radio Astronomy
DBT	Department for Biotechnology
DIT	Department of International Trade
DP	Delivery Partner
ECR	Early Career Researcher
EI	Ecological Infrastructure
EPSRC	Engineering and Physical Sciences Research Council
ESRC	Economic and Social Research Council
EU	European Union
FED	Fund to Stimulate Development
FONDECYT	National Fund for the Development of Science, Technology, and Technological Innovation
FOOD-EPI	The Healthy Food Environment Policy Index
FP	Popular Force
FWCI	Field-Weighted Citation Index
FYNCYT	Fondos para la Innovación, Ciencia y Tecnología)

G2G	Government to Government
GCRF	Global Challenges Research Fund
GDP	Gross Domestic Product
HSSE	Health, Safety, Security and Environment
IAPP	Industry-Academia Partnerships Programme
ICT	In-Country Team
ICT	Information and Communications Technology
IDB	International Development Bank
IIAP	The Research Institute of the Peruvian Amazon
INEW	Indo-UK Centre for Improvement of Nitrogen use Efficiency in Wheat
INGEMMET	Geological Mining and Metallurgical Institute
INICITEL	The National Telecommunications Research and Training Institute
IYC	Infants and Young Children
IYCF	Infants and Young Child Feeding
LAC	Latin America and the Caribbean
LIF	Leaders in Innovation Fellowships Programme
LQ	Location Quotient
MEL	Monitoring, Evaluation, and Learning
MINAM	Ministry of the Environment
MoH	Ministry of Health
MRC	Medical Research Council
MTE	Mid-Term Evaluation
NCDs	Non-Communicable Diseases
NERC	Natural Environment Research Council
NF	Newton Fund
NGO	Non-Governmental Organisation
ODA	Official Development Assistance
OECD	Organisation for Co-operation and Development
PI	Principle Investigator
PIP	Public Investment Project

PISA	Programme for International Student Assessment
PPK	Peruvians for Change
PrP	Project Partners
R&D	Research and Development
RCUK	Research Council United Kingdom
SERNAP	Peruvian Protected Areas Authority
SIN	Science and Innovation Network
SINACYT	National System of Science, Technology and Technological Innovation
SME	Small and Medium-sized Enterprises
STFC	Science and Technology Facilities Council
STI	Science, Technology and Innovation
SUNEDU	The National Superintendence of University Education
TA	Technical Assistance
UAV	Unmanned Aerial Vehicles
UK	United Kingdom
UKRI	United Kingdom Research and Innovation
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
UNHEVAL	Universidad National Hermilio Valdizan
UNICEF	United Nations Children Fund
UNMSM	Universidad National Mayor de San Marcos
UoG	Unit of Glaciology, National Water Authority of Peru, Huaraz
UPCH	Universidad Peruana Cayetano Heredia
US	United States
VfM	Value for Money
VR	Virtual Reality
WCSSP	Weather and Climate Science for Service Partnership

Executive Summary

The Newton – Paulet Fund¹ in Peru at a glance

- The Newton – Paulet Fund is currently the only large-scale UK Official Development Assistance (ODA) initiative in Peru. It was launched in Peru in 2017 by Peru’s National Council of Science, Technology and Technological Innovation (CONCYTEC) and the UK Department for Business, Energy and Industrial Strategy (BEIS).
- The themes addressed by the programme align closely with Peru’s economic development goals as well as with several of the UN Sustainable Development Goals. The Newton – Paulet Fund has focused on five priority areas: health, clean water, biodiversity, technology transfer and building researcher skills and capacity.
- The Newton-Paulet Fund's introduction has significantly improved collaboration opportunities between the two countries and has positioned the UK as a strategic partner in the Peruvian science, technology and innovation (STI) space. The only other significant player in this field is the World Bank, which provides support and funding for research projects.
- Work for several projects has been delayed by the COVID-19 pandemic. While major impacts have yet to be achieved, all three of the projects reviewed for this case study have good potential to promote this in due course.

The case study

Tetra Tech International Development produced this Partner Country Case Study in Peru to inform the Final Evaluation Report of the Newton Fund. It is one of 11 country case studies investigating the Fund’s implementation and results. It serves as a deep dive into the development, relevance, additionality, and results of (a) the programme activities; and (b) their success factors and barriers that affected their implementation.

The case study sampled three calls under the Newton – Paulet Fund, and from each a project was selected for in-depth analysis:

- **‘CASCADA: Toxin or Treat?’** project aims to increase knowledge of glacial retreat in Peru and its likely impacts on water supply and water quality, based on a study in the Cordillera Blanca mountains in the Peruvian Andes. The project team is measuring chemical changes in the water and testing methods to remediate pollution, using toxicity assessments to create a vulnerability map for use in water management. The project is ongoing, with data collection delayed by the COVID-19 pandemic.
- **New strategies to reduce anaemia and the risk of overweight and obesity through complementary feeding of infants and young children in Peru.** This project is developing new interventions to reduce anaemia and the risk of obesity by promoting healthy feeding practices for infants and young children. It is working with lower income communities in two suburbs locations in Lima and Huánuco as well as with health authorities at local and national level. The project is ongoing and has also been affected by COVID-19. While most fieldwork activities have been halted, the project is progressing in other areas.

- **Novel approaches to understand the state of biodiversity and support livelihoods.** This project used drones to map the distribution of *Mauritia flexuosa* palm trees, known as *aguaje*, in the Peruvian Amazon. Aguaje fruit is harvested by indigenous and rural communities for consumption and sale. The project created sustainable aguaje resource tools, trained local communities and stakeholder organisations to create them which ensures sustainable harvesting techniques are used. The project has also led to the publication of articles in scientific journals.

This case study is a self-contained investigation and its findings are not intended to be generalised to the entire Newton Fund in Peru. Case studies were undertaken remotely due to the pandemic and limited to reviewing three projects. In some projects, undertaking the research remotely limited the number and range of stakeholders who could be consulted. Findings reflect the data provided by each project and information available from public sources online. The volume of documentation provided varied by project, thus limiting the possibility of triangulating findings. The projects selected represent a very small fraction of all expenditure across the 5,400 Newton Fund projects. While it provides a valuable illustration of Newton Fund activities, the case study is not therefore representative of the Fund's work as a whole.

Key Findings

Effectiveness

- **In two of the three projects, fieldwork and data collection have been severely affected by the COVID-19 pandemic**, which led to strict lockdown measures in Peru from March 2020. It was only just beginning to be possible to continue with fieldwork for these projects, as this case study was produced in the Autumn of 2020. **Despite these delays, the collaborations have already led to improvements in the capacity of both researchers and local communities and partners.**
- **The Fund has been particularly effective at bringing together complementary research teams that had not worked together before.** In two of the projects, this was the first instance of direct collaboration between institutions in the two countries. The projects are viewed by participants as a positive experience on a professional and personal level. There is also good evidence for the additionality of the Fund, as all three project teams developed their ideas for joint working through workshops organised by the Fund.
- **There have been some practical challenges in implementation**, with administrative processes required by local funders in Peru sometimes causing delays or reducing the time and resources for conducting the research. The Newton Fund in-country team (ICT) based in the embassy in Lima played a valuable role in helping partners from the two countries understand and adapt to each other's way of working.

Relevance

- The thematic areas covered by the Newton-Paulet Fund span health, clean water, biodiversity, technology transfer and research commercialisation, and researcher capacity building. **These themes are highly relevant to the priority areas of the Peruvian government, the UN Sustainable Development Goals and the UK's Official Development Assistance (ODA) objectives.** The Fund has a particular focus on

generating research that can impact marginalised communities as well as topics of global concern, such as biodiversity and climate change.

- **Local partners appreciated the collaborative process through which the Fund identified areas to work on.** This was seen as fostering the creation of equitable and balanced partnerships, characterised by shared ownership. It was suggested, however, that the Fund could make more efforts to focus on issues that disproportionately impact the most marginalised communities, such as indigenous people. Further support to research translation efforts could also help meet the Peruvian government's goal of increasing private sector productivity.

Emerging signs of Impact

- Given that the Fund only started its work in Peru in 2017, **it is still early to observe significant impacts from the three projects**, especially considering the long timeframes needed to observe the impacts of research collaborations at the local level.
- However, there is evidence that the overall partnership efforts are **leading to a stronger collaboration between Peru and the UK**, with the UK increasingly being seen as a partner of choice for STI initiatives. Although two of the projects are at a relatively early stage, and one was a short-term collaboration, the **three projects all aim to lead to on the ground change, building a strong focus on community outreach and awareness-raising into their design.**

Sustainability

- **Sustainability considerations are well integrated in all three projects**, in terms of engagement and promoting take-up of new tools, findings or methods among local and national partners. There are also good indications that research partnerships developed through the Fund will continue in future. For instance, significant engagement has taken place at the local level (promoting participation and buy-in among the communities involved) and at the national level (thus increasing the potential for integration of findings into policy or scale-up of promising interventions).
- Although the research partnerships fostered by the Fund are very new, **there is appetite on both sides for continuing the relationships after the end of the project.** In the case study sample, two of the three projects have already secured additional follow-on funding, highlighting the strength of academic collaboration and interest in continuing to work together. There is also evidence of complementary skill sets and technical expertise brought by different sides of each collaboration.

Complementarity and Coordination

- **It is still too early to observe concrete signs of complementarity and coordination** with other initiatives or any indication of leadership or catalytic effects. There are no reports of Newton modalities or ways of working being replicated by other donors at present. The STI landscape is not an area where many donors are active in Peru, and other activities or programmes are not comparable in size, scope or specific focus area to the Newton-Paulet Fund.

Lessons learned

- **Where match funding was not available other strategies helped ensure buy-in and engagement.** Peruvian counterparts could not always provide match funding (none did so for the three projects reviewed), but other complementary strategies such as participatory workshops for joint priority setting were highlighted as particularly important to foster equality and relevance which helped ensure buy-in and engagement.
- **Inception phases proved particularly important,** allowing both sides of the partnership to understand each other's way of working. The Newton Fund in-country team based in Lima was instrumental in fostering mutual understanding and made a strong contribution to good collaborations. However, a longer inception phase could have further supported network building, partner identification, the development of project proposal ideas and joint priority-setting. Interviewees indicated that this might have helped overcome some of the bureaucratic processes and delays.
- **There is strong potential demand among Peruvian institutions to collaborate on STI projects.** Peru has potential for particular types of project, thanks to its natural endowments, biodiversity and areas of thematic expertise. While this potential has been overlooked in the past (with international collaboration focused on more traditional development areas), Newton-funded collaborations show that both goals can be achieved in parallel.

Considerations and recommendations for the Newton-Paulet Fund

- **There is a need to continue investing in the partnership** and foster the creation of sustainable, longer-term links. Despite its strong emerging results, the Newton-Paulet Fund collaboration remains quite novel in the Peruvian context, both in terms of the partners involved and the areas covered. Although progress has been made in this direction, further efforts (and funding) are needed for Peru and the UK to become each other's partners of choice.
- Finally, **science collaborations going forward should further consider the unmet appetite for translation projects among Peruvian partners.** Although research supported by the Newton-Paulet Fund has scope for potential application on the ground, future phases of the programme or other initiatives could have a greater focus on supporting collaboration with the private sector, an area that remains challenging in Peru. This could help foster the development, market testing and launch of practical solutions stemming from the innovative research that is being supported.

1 Introduction

1.1 Aim and purpose of the case study

This report presents our findings for our country case study of Newton Fund activities under the Newton – Paulet Fund in Peru. While these findings will inform the Newton Fund’s final evaluation, they are specific to the country under investigation and not to be generalised to the broader Fund. The strength of evidence (see Section 1.5) for this case study should guide the reading of the results set out in Sections 3 – 6. Remote research was carried out in **September – October 2020**.

The purpose of the case study is to examine:

- the relevance of the country-level work to the Newton Fund’s theory of change, including the ways in which projects have supported the Newton Fund to achieve its stated outputs and outcomes.
- the effects of Newton funding in terms of the scale and type of results delivered by the sampled projects, and their potential impact on the socio-economic challenges identified in the country and more widely.
- the likely sustainability of the activities and results of the sampled projects.

We also aim to better understand the overarching significance and impact of the Newton – Paulet Fund in Peru, such as on the internationalisation of research institutions, the relationship between the partner country and the UK, and the sharing of best practice between the two countries.

1.2 Research scope

This country case study focussed on the activities under the Newton – Paulet Fund. It assessed:

- the **development of each activity** – examining its origins, how engagement with the Newton Fund occurred, and an overview of the process of securing Newton funding.
- the **relevance of each activity** to Peru’s development needs and to Newton Fund and Official Development Assistance (ODA) goals.
- the **additionality of each activity**¹.
- the **results of each activity** in terms of the outputs, outcomes and impacts generated.
- the **success factors (and barriers) which affected each activity**, as well as the potential benefits from each activity in future.

¹ In the context of the Newton Fund, additionality aims to assess whether a given call or project could have happened in the absence of the Newton Fund (for example, through funding for similar activities provided by other programmes).

The case study included a mix of ongoing and completed activities. When assessing results, we considered their ambitions as well as early signs of impact, while recognising that these take time to emerge.

To understand how sustainable solutions to economic development and poverty reduction have emerged from Newton Fund activities, our enquiry focussed on the factors that facilitate research activities, increase the quality of research outputs, enhance international collaboration for higher-level education and translate research into innovative practices.

For the Peru case study, we consulted 22 respondents on both the United Kingdom (UK) and Peru side of each partnership, including Delivery Partners in both countries, Award Holders (AHs) and UK Embassy staff, and high-level stakeholders from partner organisations in Peru not interviewed as part of the three projects.

1.3 Case study selection

As part of our sampling methodology for the Newton Fund country case studies, we shortlisted case study calls for each country based on three measures: size, pillar, and sector (see Annex 2 for details). Project selection considered thematic areas of focus, aiming to include priority areas for the Newton Fund in each country. We also sought to achieve a spread of Delivery Partners (DPs) and activity types across the countries in our sample. Following consultations with in-country teams (ICTs), DPs and the Newton Fund Central Team, we selected **three calls per country**.

In Peru, we selected two Research and one Translation pillar activities. Projects were selected to ensure broad geographical scope and diversity of partners. When selecting the projects, we also considered the relevance of their specific research areas to the Newton Fund's priorities in Peru.

In Peru, the sampled calls and projects analysed in depth in this report are:

Funding Call	Projects
Peruvian Glacial Retreat and its Impact on Water Security and Resilience to Natural Hazards	CASCADA: Toxin or Treat?
UK-Peru: Relationship between Food, Nutrition and Health	New strategies to reduce anaemia and risk of overweight and obesity through complementary feeding of infants and young children in Peru
Institutional Links 7	Novel approaches to understand the state of biodiversity and support livelihoods: the distribution and degradation levels of <i>Mauritia flexuosa</i> stands in Amazonia

1.4 Strength of evidence assessment

Tetra Tech used a traffic light system to assess the case study’s strength of evidence (see figure 1 below).² The rating assesses the evidence supporting the conclusions reached given the methodological limitations outlined in Annex 1. Table 1 details the main sources of evidence used for this case study and the rating assigned to it.

Figure 1: Strength of evidence ratings

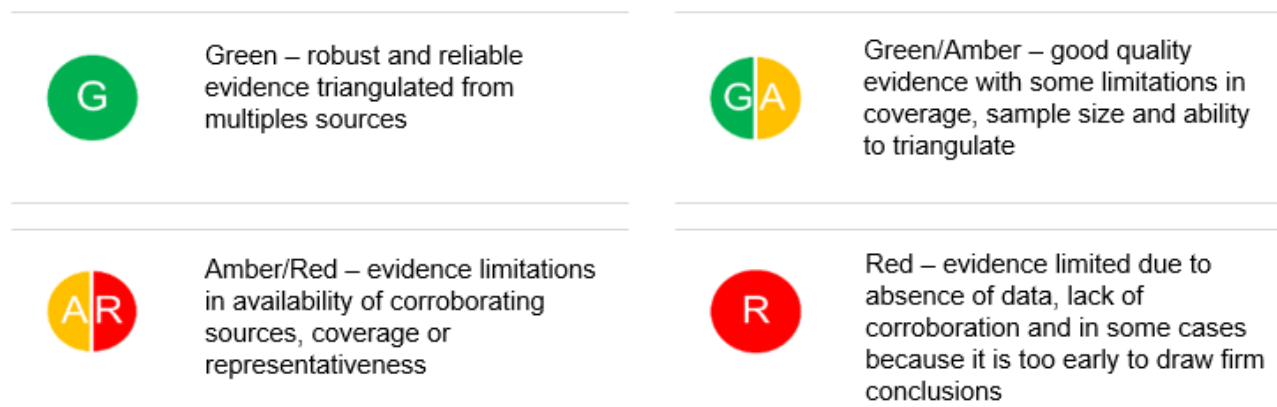


Table 1: Strength of Evidence for the Newton – Paulet Fund case study

Strength of Evidence	
<p>Green/Amber</p>	<p>There are gaps in the evidence, which limited the assessment of relevance, effectiveness, emerging signs of impact and sustainability. This is due to the relatively small sample of interviews conducted which limits the extent to which it is possible to assess if the Newton – Paulet Fund has produced results and benefited its intended recipients. In addition, the extent, type and structure of monitoring data and documentation varied across DPs, limiting the extent to which outputs and outcomes can be reviewed and triangulated.</p>

1.5 Report structure

The report is structured as follows:

- Section 2 provides an introduction to the Peruvian context, including political and economic developments and trends in the science and innovation landscape.

² Our aim was to achieve a sufficient degree of confidence about the extent to which outcomes have occurred, Newton Fund’s level of contribution to the outcomes and our theory about how the Newton Fund has contributed or failed to contribute. Confidence is affected by the extent of triangulation across sources and the position, knowledge, analytical capacity, and potential biases of primary informants. The ratings are not designed to be a rigid framework, but rather a way to ensure evaluative judgements were made systematically across the Evaluation Questions.

- Section 3 discusses high-level emerging results of the Newton – Paulet Fund.
- Sections 4 to 6 analyse the three projects in more depth, providing an assessment of the relevance, effectiveness, emerging impact and sustainability of the sampled activities.

2 Context

2.1 The Newton Fund in Peru

The Newton-Paulet Fund was launched in Peru in 2017 by Peru's National Council for Science, Technology and Technological Innovation (CONCYTEC) and the UK Department for Business, Energy and Industrial Strategy (BEIS).³ Total funding over the planned duration of the Fund was £20 million. Although Peru had previously received UK ODA funds under the UK Prosperity Fund, this came to an end in March 2017 and the Newton-Paulet Fund⁴ is currently the only large-scale UK ODA initiative in Peru.

UK Delivery Partners operating in Peru under the Newton Fund include the British Council, the Medical Research Council, the National Environment Research Council and the Royal Academy for Engineering.⁵

In Peru, the Newton-Paulet Fund has focused on five priority areas:⁶

- **health**, especially infant mortality and anaemia.
- **clean water**, including but not limited to the impact of retreating glaciers.
- **biodiversity** and unique geography.
- **technology transfer** and **research commercialisation**.
- **building researcher skills and capacity**.

The Newton-Paulet Fund's introduction has significantly improved collaboration opportunities between the two countries and has positioned the UK as a strategic partner on STI issues in Peru. The only other significant player in this field is the World Bank, which provides support and funding for research projects (see details on the *Crear para Crecer* programme below). There are some areas of overlap between the Newton-Paulet Fund and World-Bank supported work.

A distinctive feature of the Newton Fund is the requirement for matched effort from partner countries, which usually means matched funding or in-kind contributions. Matched effort is expected to help accelerate the impact of the Fund's work through the joint agreement of funding priorities and mutual interests. This element also differentiates the Fund from traditional bilateral development assistance.

³ According to the Memorandum of Understanding (MoU) between the Department of Business, Energy, and Industrial Strategy (BEIS) of the United Kingdom of Great Britain and Northern Ireland and the National Council of Science, Technology and Technological Innovation (CONCYTEC) of Peru, concerning the Newton Paulet Fund.

⁴ CONCYTEC (n.d.). 'Fondo Newton - Paulet' Available at: <https://portal.concytec.gob.pe/index.php/fondo-newton-paulet>.

⁵ Newton Fund (2019). 'Supporting excellent research in innovation through the Newton-Paulet Fund' Available at: <https://www.newtonfund.ac.uk/news/blog/supporting-excellent-research-in-innovation-through-the-newton-paulet-fund/>

⁶ Newton Fund (n.d.) 'Peru' Available at: <https://www.newtonfund.ac.uk/about/about-partner-countries/peru/>

2.2 Political and Economic context

Peru has experienced strong economic growth and poverty reduction in the two decades, becoming one of the fastest-growing countries in Latin America and the Caribbean (LAC). This was accompanied by an increased policy focus on STI.

The third-largest country in South America, Peru enjoys a wealth of natural resources and varied topography: an arid lowland coastal region, the central high sierra of the Andes, and the dense rain forest of the Amazon. It is rich in minerals such as silver and copper, and fishing is a major economic activity in coastal areas. Other important sectors besides mining include agriculture and tourism.

International trade represents 49% of national Gross Domestic Product (GDP) and the country mainly exports commodities such as copper, gold, petroleum and zinc. Trade relations are facilitated by free trade agreements which cover almost 95% of Peru's total exports.⁷ Figure 2 below provides an overview of regional and Peruvian GDP trends.

Between 2002 and 2013, Peru was one of the fastest-growing economies globally, with an average annual growth rate of 6.1% between 2004 and 2012.⁸ This remarkable growth was due mainly to exogenous factors, notably a global commodities boom which stimulated demand for mining output and agricultural goods.⁹

Poverty rates declined by 61% between 2004 and 2014, as did levels of inequality.¹⁰ Peru's Gini coefficient – measuring inequality¹¹ – decreased from 48.1 to 43.8 between 2000 and 2017¹². This figure compares favourably with that for neighbouring Colombia (53.5), Chile (50.5) and Mexico (48.2).

In recent years however, commodity price declines have led to a slowing of the Peruvian economy. The decline in growth highlighted the importance of reducing dependence on commodities, and strengthening the role of innovation, science, and technology.

⁷ Nordea, 'Country profile Peru'.

⁸ Nordea, 'Country profile Peru'.

⁹ Germán Granda (Director), María Angélica Ropert (Consultant), Lenia Planas (Consultant), Matías Boero (Audiovisual director) y Ernesto de Bustos (Assistant). Study on Strengthening Regional Innovation Systems in Peru: Policy Lessons. European Commission. 28 January 2014, p.13.

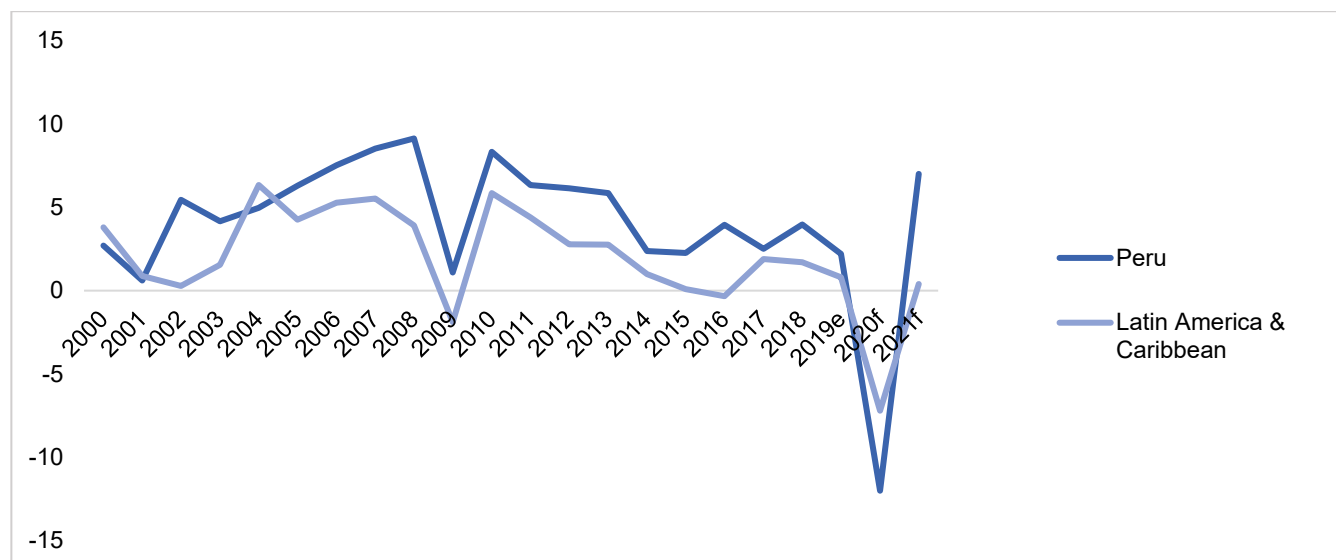
¹⁰ Oxfam (2015). Instituto Nacional de Estadística e Informática, in Inequality in Peru: Reality and Risks, Working Paper Peru N.1. Available at:

https://peru.oxfam.org/sites/peru.oxfam.org/files/file_attachments/Inequality%20in%20Peru.%20Reality%20and%20Risks.pdf

¹¹ The Gini coefficient measures the deviation of the distribution of income (or consumption) among individuals or households in a given country from a perfectly equal distribution. A value of 0 represents absolute equality, whereas 100 would be the highest possible degree of inequality.

¹² UNDP (2018). Human Development Statistical Update, UNDP's Human Development Reports 2013, 2014, 2015 and 2016.

Figure 2: GDP growth in Peru and Latin America & the Caribbean region (estimate and forecast)¹³



Source: The World Bank

According to the Organisation for Co-operation and Development (OECD) estimates, the growth of Peru's economy means it is likely to become ineligible for overseas development assistance in 2030. Peru nonetheless faces a number of challenges. These include corruption, transnational crime and illegal trafficking of narcotics¹⁴ and gold, a large informal economy and an uneven pattern of development focused on Lima.

High growth rates also hide the substantial regional inequalities and pockets of deep poverty and isolation. These disparities can be explained by Peru's diverse and challenging geography, its multiculturalism and history of discrimination of indigenous populations. Peru is a multilingual and multicultural nation where alongside Spanish, Quechua, Aymara and 60 other native languages have official status.¹⁵ Significant inequalities in education, human rights and access to opportunities are still prevalent in the country.

Human development indicators are considerably lower in rural areas, with child mortality and child malnutrition rates are twice as high, and access to education much lower than in urban areas. As of 2017, 15% of the population in urban areas lived in poverty, compared to 44% in rural areas. Indigenous groups, Afro-Peruvians and people living in rural areas, are disproportionately likely to be living in poverty and to have fewer opportunities.¹⁶

¹³ World Bank (2020). *Pandemics, Recession: The Global Economy in Crisis*, Global Economic Prospects, pg. 85-86.

¹⁴ Peru remains the leading producer of cocaine globally.

¹⁵ The equal status of Peru's aboriginal languages is recognised in Article 48 of the Political Constitution of Peru.

¹⁶ World Bank Group. (2017). *Peru - Systematic Country Diagnostic*. Available at:

<https://documents1.worldbank.org/curated/en/919181490109288624/pdf/Peru-SCD-final-3-16-17-03162017.pdf>

2.3 Science and innovation landscape

Peru lags behind many high-income countries in terms of output per worker. Promoting innovation and increasing firms' productivity therefore has an important role in ambitions to sustain strong economic growth in future.

A significant constraint to fostering STI development in Peru is the quality of education and employment and limited investment in human capital, considered one of the lowest in Latin America.¹⁷ The 2018 Programme for International Student Assessment (PISA), which evaluates students' performance in reading, mathematics and sciences, found that students in Peru scored lower than the OECD average in all three areas.¹⁸ Peru's spending on education is the lowest in the region¹⁹ and levels of private sector investment in innovation are also low.

These challenges are compounded by low English language skills, limiting access to high-quality academic publications and hindering progress in research and knowledge generation.²⁰ In 2018, Peru ranked 7th in Latin America in terms of number of academic papers published. Peru also has one of the lowest ratio of researchers per million inhabitants in the region, at less than 80 per million inhabitants, compared to 1,200 per million in Brazil, 1,941 in Argentina, 551 in Chile and 346 in Colombia. Limitations in human capital, particularly female staff, have been identified as one of the main constraints on productivity and innovation in Peru, according to the 2012 National Innovation Survey.²¹

In recognition of these challenges, the Peruvian government has introduced various legal and policy reforms to improve STI in the country. Notably, in 2018 a new action plan for competitiveness recognised innovation as one of its main pillars, and CONCYTEC was given a new mandate to promote this.²² In 2019 the government passed a law to attract and retain highly qualified scientists. With World Bank support, this led to the incorporation of 181 local and foreign researchers into Peruvian institutions in 2019.²³

A small number of institutes serve as centres of excellence in Peru's research system. The *Pontificia Universidad Católica* is regarded as the most prestigious university, occupying 248th place in the 2015 QS World University ranking. While by law universities must devote resources to research, Peru has not yet developed a strong science and technology infrastructure in its university system and public research institutions.

Peru's research output is highly focused on agricultural sciences, biology and biomed, information and communications technology and social sciences. Peru's specialisation rate in

¹⁷ OECD (2016). Science, Technology and Innovation Outlook, 'Peru'.

¹⁸ OECD Programme for International Student Assessment (PISA) 2018 Database. PISA is the world's most comprehensive and reliable indicator of students' capabilities. OECD produces a triennial report on the state of education around the globe. PISA 2018: Insights and Interpretations, Andreas Schleicher.

¹⁹ Danko (2017). Furthering Peru's Public Education in the Face of Financial Challenges, Perspectives on Business and Economics, Volume 35 – Leveraging Peru's Economic Potential, p.91. Available at: <https://preserve.lehigh.edu/cgi/viewcontent.cgi?article=1010&context=perspectives-v35>

²⁰ D'Andrea (2007). Peru: Inequality of Education for Indigenous Groups, the Neglected Class, p. 6.

²¹ P. Zuniga (2016). Innovation System in Development: The Case of Peru Working Paper Series UNU-Merit Working Papers Innovation System in Development: The case of Peru, p. 23.

²² OECD (2011). Reviews of Innovation Policy: Peru. Available at: <https://dx.doi.org/10.1787/9789264128392-en>

²³ Nature (2020). 'Peru's research: national council responds' Available at: <https://www.nature.com/articles/d41586-020-00615-2>

agricultural sciences is second only to Kenya among the Newton Fund countries, while its ICT specialisation rate has increased during the evaluation period. Peru’s specialisation rates in engineering and physics are considerably below the global average.²⁴

2.4 Overview of research funding

Peru’s science, technology and innovation system reformed in the mid-2000s.

CONCYTEC is the main body overseeing STI funding in Peru. It is also in charge of policy implementation through its operational arm, the National Fund for the Development of Science, Technology, and Technological Innovation (FONDECYT).

Its Regional STI Councils (COURCYTEC) are have representatives from government, R&D sectoral institutes, universities, corporations and civil society to support regional capacity building in R&D and innovation. The government also launched several technological innovation centres in 2000, designed to provide technological support to small and medium enterprises (SMEs) and producer associations. Figure 3 maps the wider R&D landscape in Peru, including private and public sector research and funding bodies.

Figure 3: Science, Technology and Innovation Landscape in Peru²⁵

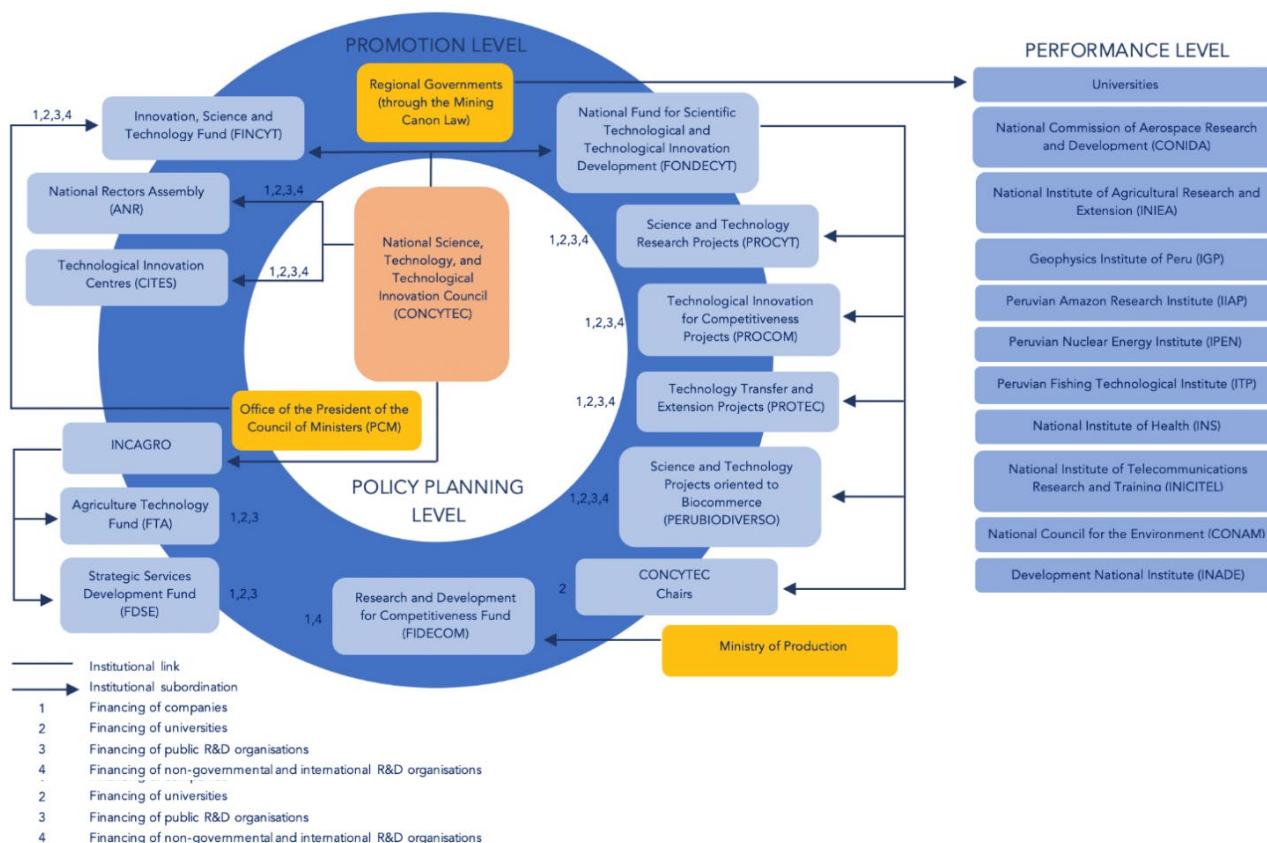


Figure 3: Science, Technology and Innovation Landscape in Peru²⁶

²⁴ Scopus (data sourced from U.S. National Science Foundation).

²⁵ TU Delft (2016). Open Research Platform, Worp, N., 'National Innovation System Peru' Available at : <https://tudelft.openresearch.net/page/13887/national-innovation-system-peru>.

²⁶ TU Delft (2016). Open Research Platform, Worp, N., 'National Innovation System Peru' Available at : <https://tudelft.openresearch.net/page/13887/national-innovation-system-peru>.

There have been important investments in STI in recent years, and the introduction of several new policies, as summarised in Table 2. In 2012, CONCYTEC’s budget was USD 5 million. This grew almost eightfold (to USD 39 million) over the course of 5 years.²⁷ The government’s public spending on R&D has also increased over the past decade reaching USD 63 million in 2020.²⁸

Table 2. Policies, Strategies and Legislation related to STI in Peru

Policy, strategy or framework	Description of priorities
Framework Act on Science, Technology and Technological Innovation	The 2004 act defines the National System of Science, Technology and Technological Innovation, establishing CONCYTEC as its governing body and FONDECYT as its operational arm.
National Strategic Plan for Science, Technology, and Innovation for Competitiveness and Human Development	This was the first national vision and agenda for STI developed at the country level by CONCYTEC. While the plan has a long-term horizon, it has been criticised as largely remaining a list of needs, with weak implementation due to the lack of a concrete action plan and budget allocation.

2.5 Bilateral relations with the UK and international collaboration

The UK and Peru have had good bilateral relations over a long period. The UK was one of the first countries to formally recognise Peruvian independence in 1823, triggering British investment and migration. By the 1830s, more than 50% of imports to Peru came from the UK.²⁹ To this day, the UK remains the second most important investor in Peru, following the United States. Some have perceived the UK’s exit from the EU as an opportunity for the two countries to strengthen their bilateral ties and sign a bilateral trade agreement.³⁰

In 2017, the UK signed an agreement to deliver infrastructure and oversee preparations for the 2019 Pan-American Games in Lima,³¹ drawing on experience from the 2012 London Olympics. In June 2020, Peru and the UK signed an agreement for a reconstruction and knowledge sharing programme which will run from 2020 to 2022. This makes the UK’s Department of International Trade (DIT) a Delivery Partner in rebuilding infrastructure and facilities damaged

²⁷ The World Bank (2016). Project Appraisal Document on a Proposed Plan in the amount of US\$45.00 million to the Republic of Peru for Strengthening the Science, Technology and Innovation System in Peru, p.2. Available at : <http://documents1.worldbank.org/curated/fr/564341468086336618/pdf/NonAsciiFileName0.pdf>

²⁸ gob.pe (n.d). ‘Consejo Nacional de Ciencia, Tecnología e Innovación Tecnológica (CONCYTEC)’ Available at: <http://go.nature.com/2ufux1k>

²⁹ Foreign, Commonwealth and Development Office, Dauris, J., ‘A celebration of friendship between UK and Peru’ Available at: <https://blogs.fco.gov.uk/jamesdauris/2013/04/19/celebrando-la-amistad-entre-el-peru-y-el-reino-unido-2/>

³⁰ Andina (2017). ‘Peru, UK to strengthen bilateral relations following Brexit’ Available at :

<https://andina.pe/ingles/noticia-peru-uk-to-strengthen-bilateral-relations-following-brexite-691686.aspx>

³¹ Gov.uk (2017). ‘UK to be main Delivery Partner of Lima 2019 Pan American Games’ Available at :

<https://www.gov.uk/government/news/uk-to-be-main-delivery-partner-of-lima-2019-pan-american-games>

by El Niño weather events in 2017, including reconstruction of 74 schools, and the construction of 15 new health centres and seven storm drainage systems³².

Funding initiatives similar to the Newton Fund

Peru has some strong institutional ties in the research and education fields with other countries. The country currently has agreements to promote bilateral collaboration with 22 countries in the Americas, 21 countries in Europe, three countries in Africa, and an agreement with Australia. Traditionally, the US, France and Germany have been more active than the UK in fostering academic cooperation through their embassies.

Past research collaborations have mainly focused on areas of international interest such as archaeological research (especially at ancient Inca sites) and transmissible disease (such as dengue), in which Peru holds a comparative advantage. However, interviews for this case study confirm a prevailing perception that these cooperation initiatives were mainly driven from abroad. Overall, research collaborations in other fields remain limited and have only recently started to emerge. For example, South Korea has begun to develop closer ties in the field of telecommunications. Outside the STI field, the mining sector continues to provide the basis for much of the bilateral cooperation between Peru and other countries.

Over the past two decades, several initiatives run either by the Peruvian government alone or in collaboration with international actors have taken place intending to support the development of Peru’s STI capabilities and the private sector’s capacity to innovate to increase productivity. Table 3 provides an overview of the main initiatives.

Table 3 Funding initiatives similar to the Newton Fund³³

Funding Initiatives	Body	Description
<i>Crear Para Crecer</i> ³⁴ (2014-2016)	World Bank – CONYTEC	A USD 100 million programme supported by the World Bank to strengthen the STI system, improve research skills and firm-level innovation. The World Bank contributed USD 45 million. ³⁵
Fondos para la Innovación, Ciencia y Tecnología	International Development Bank	The Fund promoted a wide range of programmes, the most important aimed at capacity building for companies, universities and public research centres to

³² Gov. uk (2020). ‘UK selected as Peru’s Delivery Partner to rebuild facilities damaged by El Niño’ Available at: <https://www.gov.uk/government/news/uk-selected-as-perus-delivery-partner-to-rebuild-facilities-damaged-by-el-nino>

³³ Granada, Ropert, Planas, Boero y Bustos (2014). Study on Strengthening Regional Innovation Systems in Peru: Policy Lessons. European Commission, pg 16-17.

³⁴ CONCYTEC (n.d.). ‘CONCYTEC Lanza Hoja de Ruta para Dinamizar a la Ciencia, Tecnología y la Innovación’ Available at: <https://portal.concytec.gob.pe/index.php/noticias/164-concytec-lanza-hoja-de-ruta-para-dinamizar-a-la-ciencia-tecnologia-y-la-innovacion>

³⁵ World Bank (2016). Project Appraisal Document on a Proposed Plan in the amount of US\$45.00 million to the Republic of Peru for Strengthening the Science, Technology and Innovation System in Peru, p.5-11. Available at: <https://documents1.worldbank.org/curated/en/435341484362907655/pdf/Peru-PAD-12212016.pdf>

(FYNCYT) Fund (2007-2013)	Peruvian government	promote research, innovation and further collaboration between the public and private sectors.
Innovation for Competitiveness Project ³⁶ (2017-2021)	International Development Bank Peruvian Government	The programme supports the export of high-tech products and services and boosts public spending for scientific research, technological development, and innovation for business, especially in the high-tech sector.

³⁶ World Bank (2016). Project Appraisal Document on a Proposed Plan in the amount of US\$45.00 million to the Republic of Peru for Strengthening the Science, Technology and Innovation System in Peru.

3 The Newton-Paulet Fund in Peru

This section sets out the emerging results of the Newton Paulet Programme. The findings are based on the three calls included as part of the case study as well as the broader consultations undertaken with the programme team (see Section 1.4 for details of the methodology).

3.1 Key Findings

Interviewees widely perceived the Newton-Paulet Fund to be a useful and valuable partnership. All interviewees – both on the UK and Peruvian side of the partnership – spoke highly of the Fund. There was a strong agreement that the Fund’s range of projects is closely aligned to Peru’s priorities and current challenges. The Fund was also perceived to be aligned with government priorities, which has resulted in strong buy-in at senior level among Peruvian government stakeholders.

The main Peruvian partner, CONCYTEC, is firmly committed to the Newton Fund, and there is strong support for it at senior leadership level within institutions. This can be seen as a consequence of strong institutional relations with the British embassy, and also because many staff members at high levels in CONCYTEC are UK-educated and have existing links with UK universities.

The Newton-Paulet Fund is unique in Peru’s donor landscape in terms of its size, scope and focus areas. It represents the biggest international collaboration for CONCYTEC, followed by the World Bank capacity building support programme, which is the only comparable programme in terms of size and scope.

Case study research points to several aspects that differentiate the Newton-Paulet Fund from other programmes. First, the Fund presents a strong and explicit commitment to supporting Peru’s socio-economic development needs. One of the Fund’s strengths in Peru, is its design and purpose as an ODA programme. This makes it highly relevant to the socio-economic challenges faced in partner countries. In Peru, this was apparent at the portfolio level. The programme focuses on three priority areas that are almost unanimously seen by interviewees as being key for the country’s sustainable development goals: biodiversity, health and nutrition, and access to water.

The Fund was seen as a highly relevant and egalitarian partnership. Local counterparts appreciated the process employed to design and define calls, which led to the selection of research areas in line with local priorities. This collaborative process was particularly valued by local partners and considered a key strength of the programme. Match funding was seen as important in fostering shared ownership and increasing the perception of equality in the partnership. At the same time, there are reports that securing a sufficient level of matched resources is difficult for some Peruvian institutions. In this light, the move towards ‘matched effort’ (rather than funding) is seen as positive.

The themes identified and prioritised by the programme are conducive to Peru’s long-term economic development goals. In particular, the Fund’s focus on supporting and strengthening the overarching STI system, building capacity, and strengthening linkages to foster translation between academia and the private sector is also novel in the donor space in Peru. The Fund was seen as already having improved research quality and is increasing collaboration between the UK and Peru. The Fund is also seen as having strengthened the

Peruvian STI system overall, fostering a local community of practice in STI. As noted by one respondent:

“When I started my current role, one award holder told me that had it not been for the Newton Fund in Peru, Peruvian researchers would not be talking to each other. I didn’t understand it at the time, but it is true, the Newton Fund has created forum where national researchers have come together and found an opportunity to interact.”

The programme has strengthened collaboration between UK and Peruvian institutions. In many cases, it has led to the establishment of entirely new partnerships. It has allowed the research teams from the two countries to understand and adapt to each other’s way of working, fostered the creation of potential longer-term links between academic institutions and government agencies. **The flexible and context-specific nature of the programme was seen as particularly useful to promote sustainable connections.** The Fund’s way of working was seen as opening new frontiers of UK science, with the UK increasingly becoming a partner of choice in Peru. The quality of the partnership was praised across the board and seen as holding potential for further growth. For example, in the words of one respondent:

“My experience has been good. I find them a reliable partner, flexible, cooperative and understanding with all the restrictions that the Peruvian public sector faces.”

Supporting factors for the Fund’s emerging results in Peru

UK-Peru relations were already very strong at the outset of the Fund, as the two countries have historically enjoyed strong economic and cultural ties. Of European countries, the UK has the greatest number of schools teaching its curricula in Peru (only France has a comparable presence to that provided by the British Council in Lima). Interviewees reported that in recent years, the relationship between the UK and Peru has become even stronger, partly thanks to the Fund. Local partners and award holders alike recognise the Newton-Paulet Fund as a **strong brand in Peru**.

Potential for socio-economic impact and inclusive, sustainable development was seen as another key differentiator of the Newton-Paulet Fund. Although its financial support is important, the Fund’s value is seen as going much beyond the finances provided. In particular the programme is seen as creating ‘a path for partnership’ in diverse themes, which do not strictly fall under the ‘hard sciences’ categorisation, and which do not always receive high levels of attention or international funding. Some of the mentioned areas include fostering agro-biodiversity, culinary sciences, traditional and indigenous knowledge, and protecting biodiversity.

The embassy’s in-country team (ICT) played an important role in strengthening the UK-Peru relationship in STI and ensuring the Fund was relevant to the local context and in promoting mutual understanding.

Due to the absence of a Science and Innovation Network (SIN) officer within the UK Embassy in Peru, the Newton Fund team effectively serves as **the face of UK STI policy**. Respondents across the board highlighted the ICT’s importance in serving as a bridge between UK and Peruvian counterparts. As highlighted by one respondent:

“The Newton Fund in Peru is seen unanimously by technocrats, researchers, and government organisations as great partner to work with, because it is flexible, and it has a good understanding of the Peruvian public and private sector. This is because they

centralised operations in Lima. It is very important to have figures in Lima that are able to interact very quickly with the private and public sector. [...] Face-to-face interactions are still very important. In that regard, the strategy followed by the Newton Fund people in Lima has been very successful.”

3.2 Challenges and lessons learned

The programme has encountered some challenges.

A first challenge faced is a continuing **language barrier**. Many respondents noted that for Peruvian researchers producing and disseminating research in English is an obstacle. This is reflected in the relatively lower numbers of publications (see Section 2). While fluency in English is needed for project collaborations, respondents noted that many highly experienced and reputable Peruvian researchers do not speak English very well.

A second challenge in the country is the strong interest in collaborations in areas that align with ODA priorities but are **not currently supported by the Newton-Paulet Fund calls**. These include issues that are of high relevance to marginalised communities in Peru which hold the potential for substantial development benefits. Examples include areas relating to biodiversity, such as traditional medications and indigenous knowledge generation.

Third, although Newton was praised for being flexible and adapted to the local context, some respondents argued that **this flexibility could be increased** to take better account of country-specific timelines, bureaucratic ways of working, funding limitations and other contextual challenges. It was also suggested that the scope for fully equitable partnerships could be boosted by running more frequent workshops to connect partners, understand capacity levels and research interests, and also to introduce seed funding in the form of networking and mobility programmes.

Respondents also highlighted that more could be done to address structural challenges that hinder the programme's potential impact in **working with the private sector**. Factors that limit this are reported as being:

- Low level of interest and capacity to take up research and innovation findings by the private sector with many companies perceiving innovation in terms of the purchase of technology and equipment.
- Lack of financial capacity by SMEs to invest in research and innovation internally.
- Bureaucratic processes and the different working styles between academia and the private sector.

To increase the potential impact of Translation Pillar interventions, future phases of Newton-Paulet or other STI programmes in Peru could consider how to tackle these challenges, drawing on the UK's extensive experience in promoting industry-academia collaboration.

4 Project: CASCADA: Toxin or Treat?

Summary

Project title	CASCADA: Toxin or Treat?
Call title	Peruvian Glacial Retreat and its Impact on Water Security and Resilience to Natural Hazards
Short description	The CASCADA project investigates the impacts of glacier retreat and metal toxicity in rivers in the Cordillera Blanca range in the Peruvian Andes. The project aims to offer pre- and post-treatment metrics for river toxification, employing a citizen science model to gain community buy-in. In doing so, CASCADA aims to create novel solutions to metal toxicity and acidification in rivers.
Objective(s)	<p>Identify the main drivers of vulnerability to glaciers retreat;</p> <ul style="list-style-type: none"> • predict acidity of water in glacier basins and vulnerability to acidification. • provide tools for different stakeholders – such as NGOs, local authorities, local communities and civil society – to diagnose and prevent damage. • provide a framework for decision-makers to make investments in ecological infrastructure, which can be used elsewhere.
Pillar	Research
Acton value (total budget allocated in country, in GBP)	UK: GBP 504,161 PE: n/a
Start/end date (Status: on-going or complete)	February 2019 to December 2021
DP UK and overseas	Natural Environment Research Council (NERC) (UK) CONCYTEC (PE)

Award holders/grantees	<p>UK: University of Bristol</p> <p>PE: Universidad Peruana Cayetano Heredia (UPCH), Unit of Glaciology, National Water Authority of Peru, Huaraz (UoG), Institute of Geophysics of Peru</p>
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Description of the project

The CASCADA project is part of the 'Peruvian Glacial Retreat and its impact on water security and resilience to natural hazards' call. This focused on water quality and resilience to natural hazards in the face of retreating Peruvian glaciers. NERC and CONCYTEC respectively committed £3 million and £200,000 to the overarching call.

Peru hosts 71% of the world's tropical glaciers and the country relies on glacial runoff to provide water for drinking, agriculture, hydroelectricity and industry. This water supply is at risk due to a 20% reduction in the surface area of glaciers over the past 30 years.

CASCADA brings together a multidisciplinary team of glacial biogeochemists, glaciologists, sensor developers, ecologists and paleo-environmentalists, water resource, and remote sensing experts. The team is developing a new process-driven understanding of vulnerability to glacial melting in the Cordillera Blanca of Peru and the risks that accompany this. The collaboration aims to understand and quantify biogeochemical change while developing new methods to remediate acidic, metal-rich waters.

The main hypothesis being tested by the project is that glaciated catchments in the Cordillera Blanca are rapidly changing: going from pristine conditions, where glacial runoff is an important nutrient source for downstream ecosystems (a 'treat'), to a situation where this same runoff becomes toxic to ecosystems and human health (a 'toxin'). At present, there is limited understanding of the evolution from 'treat' to 'toxin' in Cordillera Blanca glaciers; however, these likely depend on the complex interplay between glaciation history, hydrology and geology. For this reason, the project takes an integrated, multi-disciplinary and process-based approach to studying glacial runoff and its effects.

Pathway to impact

As illustrated in Annex 4, Figure 5, this project fits closely with the Newton Fund's Theory of Change for Research Pillar and People Pillar activities. The project's impact logic outlined in Figure 5 is further expanded upon below.

Activities:

- **Work package 1 (Processes and Buffers):** Research activities assessing year-round dynamics of 'treat' to 'toxin', tracking upstream biochemical inputs and also evaluating the effectiveness of downstream groundwater and wetland buffers against acid and metal inputs³⁷.

³⁷ These are setback areas between a stream, river or wetland and a glacier or ice-sheet. Wetland buffers, instead, are "naturally vegetated upland areas adjacent to a wetland or surface water" (Chase et al, 1995). CASCADA

- **Work package 2 (Vulnerability):** Research to identify regional responses to 'treat' to 'toxin' evolution in Cordillera Blanca catchments with simple metrics for policymakers to assess catchment vulnerability.
- **Work package 3 (Solutions and Resilience):** Research to develop and evaluate a novel, user-friendly wetland management system that can remedy acidified and metal-rich rivers, working closely with local community stakeholders.

Expected Outputs:

- **Pre- and post-treatment metrics** on the toxicity levels of rivers in the Cordillera Blanca region along with a vulnerability map for the whole region which can be used by water resource managers.
- **Academic publications** to disseminate research findings through articles, a project website and the webpages of the universities and government institutions involved.
- **Improved capacity of researchers** to work in the specific technical areas covered by the project.
- **Datasets that can be used to help predict** how, when, and why glaciated Cordillera Blanca catchments are likely to become more toxic.
- **An app for water monitoring** to be made accessible and usable by local communities.
- **A framework for decision-makers to use in making investments** in ecological infrastructure in the localities studied by the project, which can be used elsewhere.

Expected Outcomes:

- A **better understanding of glacial retreat** in the Peruvian Andes, focusing on the impacts of glacier shrinkage on water ecosystems.
- **Better understanding of the risks posed by climate change to local communities and ecosystems**, informing how policy and local-level responses can help address this, resulting in solutions to water toxicity.
- **Technical expertise** that can be applied in future collaborations elsewhere to predict water quality evolution in deglaciating terrains.

Expected Impact:

- **Conservation of Andean water resources**, with a positive impact on local ecosystems and the health and livelihoods of the local population.

4.1 Emerging project results

studies the wetland ecosystems that are unique to high-altitude Andes. These are characterised by native flora, consisting of moss and grass. The wetlands retain and filter water. Studying these wetlands is an integral component for the design of a green infrastructure.

Relevance of Newton Fund activities

Relevance to ODA priorities

The project is strongly relevant to the UN Sustainable Development Goals and to the UK's ODA objectives. Peru is home to 71% of all tropical glaciers, which have all undergone high rates of mass loss and retreat³⁸ in the last three decades due to increasing temperatures and changes in precipitation. The Cordillera Blanca holds 40% of Peru's glacial reserves, and 250,000 people depend on the melting of these glaciers for drinking water, agriculture, and hydropower in the dry season. Pollution and water acidity pose important water security threats to local communities and the agricultural, animal husbandry and mining sectors. The project's outputs will ultimately contribute to supporting the lives and livelihoods of remote communities in the Cordillera Blanca, as well as mining, which is one of the most important sectors in the Peruvian economy.

Relevance to Peruvian priorities

Prediction of future toxicity and mitigation strategies are urgently needed to enable the Peruvian authorities to ensure water security for these vulnerable populations. The project is also testing a community-deployed novel wetland management tool to remediate toxic rivers. This addresses issues relating to water security, sustainable livelihoods and poverty.

Additionality

Respondents' views suggest that the project would not have taken place without the Newton-Paulet Fund. In particular, the Fund allowed a large, multidisciplinary team to be brought together and also provided institutional support fostering dialogue and effective collaboration. Moreover, the idea for the collaboration itself resulted from the design of this call, with researchers were explicitly brought together through a workshop by Delivery Partners NERC and CONCYTEC to explore potential areas of collaboration.

4.2 Effectiveness of Newton Fund activities

Emerging results

The three Work Packages are at different stages and have made varying levels of progress – in part due to the effects of COVID-19.

Work Package 1 has, so far, seen the most progress, with research activities still ongoing. The first research phase collected biodiversity samples in the rainy season. The second phase, collecting samples during the dry season, was halted due to COVID-19 travel restrictions. Nevertheless, data gathered in the second phase has been processed and analysed. Therefore, as soon as travel restrictions in the Andean region are lifted it will be possible to proceed with the remaining fieldwork.

The main result thus far, therefore, has been the collection of water samples. What is pending is systemising the information and proceeding with the second phase of data collection. The team has also installed sensors to track physical chemistry parameters in different micro-basins. Thanks to these samples, **the team has been able to better understand the chemical processes impacting water quality and how this impacts the functioning of the local**

³⁸ Kaser et al (2002). Tropical Glaciers, Cambridge University Press: New York.

ecosystem. Once further evidence is available, the project will proceed to Work Package 2, developing metrics for policymakers to assess water catchment vulnerability.

As part of Work Package 3, the research team has also been working on developing and testing **remediation techniques**, such as making use of local wetlands, improving water quality standards, and supporting irrigation activities. An app ('AquaBioSmart') is being developed to support users to evaluate water quality using biological indicators. Some training on these tools has already been provided to a local committee of water users, enabling them to assess and report on water quality.

Quality of Research Collaboration

The collaboration has enabled the creation of a strong interdisciplinary research team with a complementary set of skills, bringing together a UK glaciologist and a Peruvian eco-toxicologist. This unique combination of skills represents the setting stone for advancing the study of water quality and glacier retreat in Peru. **The collaboration has already strengthened the research team's understanding in this specific field.** Collaborating with UK partners and others in Peru has improved access to the technology needed to study glacial melting and its implications. The collaboration has also built the capacity of students and Early Career Researchers involved in the research.

Benefits to the UK

The project has brought benefits for the UK researchers in providing complementary expertise and interaction with local communities in Peru. For UK team members, it also represented the opportunity to carry out research in a country where none had previously worked. Working closely with Peruvian partners has increased the quality of research findings and their applicability. **Overall, the collaboration has strengthened the UK institutions' network with researchers in different areas of Peru.**

Additional benefits

A dramatic production inspired by the project featured at the **Hay Festival of Literature and Arts in 2019**, with a Newton Fund additional activity grant supporting a collaboration between the actress Erika Stockholm and the project team³⁹. They wrote and performed a short play on the story of a glacier that died because of human activity, communicating the importance of the research topic to a general audience and disseminating scientific knowledge in a more accessible manner.

Challenges in the collaboration

Participants from both sides expressed strong satisfaction with their experience with the Newton Fund and the level of collaboration between the two teams. Some challenges were reported, however. **Some Peruvian researchers in particular said the Peruvian funder's processes were overly burdensome and reduced the time for the research itself. Slow processes with limited flexibility were not suitable to the needs of fieldwork activities.** This was particularly noticeable during the second round of fieldwork when the outbreak of COVID-19 required quick adaptations.

³⁹ Hay festival (n.d.) 'HAY FESTIVAL TRANS.MISSION II'. Available at: <https://www.hayfestival.com/hay-on-earth/transmission-ii/uk>

4.3 Emerging signs of impact

The CASCADA project has strong potential for impact, as explained above. It aims to derive simple metrics which water resource managers can use to predict future river toxicity, and then to mitigate this. The team is also actively looking to create opportunities for technology transfer by sharing project findings with mining companies active in the region and involving them in developing long-term solutions.

The project is ongoing, so it is too early to observe tangible signs of on the ground impact. There is however good potential for real impact in the longer run.

The work led by the project is likely to prove relevant to Peruvian policymakers. At present, decision-makers at the local and national lack concrete information about the status and value of water-regulating ecosystems in the Andes areas. However, key stakeholders are represented on the External Engagement Board, providing a means for project findings to influence policy. These include the **Water National Authority of Peru – ANA, Consortium for the Sustainable Development of the Andean Ecoregion – CONDESAN, National Association of Water Utility and Sanitation Entities of Peru** the environment ministry's climate change adaptation program.

Due to its focus on water quality monitoring and management, the research is also helping to support sustainable agriculture, another key sector in the area that has become increasingly important, particularly during the COVID-19 pandemic. Effects in terms of sustainable economic development and impact on livelihoods are not yet observable but may become apparent in the longer run.

Sustainability

There is good evidence that sustainability concerns were closely integrated into the design of the project. In particular:

- Significant effort has been made to engage with a wide variety of stakeholders at the local, national and international levels, including through the **External Engagement Board**, established as an active body involving multiple stakeholders.
- The project embodies explicit ambitions to ensure community engagement with proposed solutions. For instance, an Action Group in charge of wetland operation and management has been formed, with **community members directly involved in the reporting of water quality biomonitoring**.
- To further increase outreach and uptake potential, the research team will **also collaborate with the Cabot Institute for the Environment in Bristol**, which focuses on interdisciplinary environmental research, training, and outreach.
- The project is planning to work with British film company Chouette Films **to create the first VR experience of the Andean region's tropical glacier retreat**. Metal toxification found in CASCADA field sites is highly visual, with orange rust (through iron oxidation) staining the landscape. This presents an opportunity to capture images of high visual appeal suitable for public awareness raising.

- Going forward, the main Peruvian partner, University Cayetano Heredia in Lima **is discussing the potential further work with the UK and other international partners** in this subject area.

Complementarity and coordination

The CASCADA project has clear ambitions to influence environmental policy in the Ancash region and beyond and has established formal mechanisms (see previous paragraph) to promote this. The engagement of both local- and national-level institutions explicitly aims to raise awareness of the research and its findings at different policymaking levels.

The project also aims to ensure community buy-in for solutions proposed in the project at the local level. Community members are directly involved in the reporting of water quality biomonitoring and can also contribute towards the sustainability of the project results and changes in attitude and behaviours.

4.4 Conclusions

- **CASCADA is a highly relevant research collaboration bringing together glaciologists, eco-toxicologists and numerous partners at the local, national, regional and international level.** The collaboration focuses on generating new evidence on the impact of glacial melting and metallic run-off on water quality. The research also has a strong ambition to help inform policymaking and raise awareness of glacial melting more broadly. Research findings hold important potential implications for health, livelihoods and the local ecosystem in the region surrounding the Cordillera Blanca mountain range in Peru.
- **The project is ongoing, and fieldwork has been paused due to COVID-19.** Despite this, the team was able to complete initial data collection and start analysing water samples. The team has already identified indicators of water quality changes and has been working on the development of remediation techniques. The next phase of the project will collect samples during the dry season once travel restrictions are lifted.
- **This collaboration has provided Peruvian partners with access to specialised technology, while for the UK it has brought in different and complementary expertise and the opportunity for a higher level of interaction with local communities in Peru.** Seen as a strong partnership across the board, the project is the first international collaboration for several of the Peruvian partners and will set them up for future collaborations.

Lessons learned

- The project has already received attention and interest among local and national authorities, as well as the international public. This highlights **the importance of developing a comprehensive dissemination and stakeholder engagement plan during the project design phase.**
- The project created an External Engagement Board at start-up and has included a citizen engagement component to help ensure community buy-in throughout the various research phases. These two elements will **help ensure findings inform evidence-based policymaking and improved local practice.**

- It remains to be seen what this will entail in terms of local-level change will emerge – including whose voices are captured in discussions on the issues uncovered by the project. **Inclusive discussions with the local community** can help ensure that the tools such as the wetlands-based water management system and the AquaBioSmart app, are used in practice, appropriate for the local context, and responsive to local communities' needs.

5 Project: New strategies to reduce anaemia and risk of overweight and obesity through complementary feeding of infants and young children in Peru

Summary

Project title	New strategies to reduce anaemia and risk of overweight and obesity through complementary feeding of infants and young children in Peru
Call title	UK-Peru: Relationship between Food, Nutrition and Health
Short description	The project used novel methods to examine infant and young child feeding in two suburban centres in Lima and Huánuco. The project also organised participatory workshops with communities to identify solutions to the challenges of healthy feeding. These workshops will develop interventions which will then be piloted in the local community.
Objective(s)	<p>The primary aim of the project was to develop culturally acceptable strategies to address the risks of anaemia and excess energy intake in infants and young children aged 6-23 months in Peru. Objectives included:</p> <ul style="list-style-type: none"> • Identify the socio-cultural, behavioural and environmental influences on infant and young children nutrition feeding practices in two distinct Peruvian regions. • Develop and pilot new strategies to address malnutrition (both micronutrient deficiency and obesity risks) through participatory design methods and prototyping interventions with families, community childcare and health facilities. • Inform the development of feeding guidelines for children under two, currently under review by the Peruvian Ministry of Health, by mapping global, national and local policies and developing actions to address malnutrition.

	<ul style="list-style-type: none"> Work with local government health services and stakeholders to build their capacity to implement participatory approaches in infant and young children feeding interventions.
Pillar	Research
Acton value (total budget allocated in country, in GBP)	UK: GBP 769,785 PE: n/a
Start/end date (Status: on-going or complete)	April 2019 to April 2022
DP UK and overseas	Medical Research Council (MRC) (UK) National Council of Science, Technology and Technological Innovation (CONCYTEC) (PE)
Award holders/grantees	UK: Loughborough University, the University of Sheffield, the University of Leicester PE: Instituto de Investigación Nutricional; Universidad Nacional Mayor de San Marcos

Description of the project

The project aims to develop culturally acceptable healthy eating strategies to address the risks of anaemia and excess energy intake among infants and young children aged 6 to 23 months in Peru. The project is applying novel methods and taking a holistic approach to examine infant and young child feeding (IYCF) in two distinct suburban areas, coastal Lima and Huánuco in the Central Highlands.

Dietary risks are the single biggest risk factor driving death and disability in Peru. The country faces significant maternal, neonatal and nutritional challenges, as well as an increasing burden of non-communicable diseases (NCDs), including anaemia, diabetes, obesity, hypertension, chronic malnutrition and stunting. These problems have persisted over time despite government efforts to address them.

The project is developing interventions which will be piloted in local communities. It will also provide evidence to support the review and implementation of government guidelines and raise awareness on healthy eating at community level.

Pathway to impact

As illustrated in Annex 4, Figure 6, this project strongly fits the Theory of Change for Newton Fund Research Pillar and People Pillar activities. As shown in the figure, the main **project activities** include.

- Work package 1:
 - conduct research on the drivers of infant and young child feeding patterns and practices in relation to caregiver behaviours and household, community and socio-cultural environments. Methods employed include i) assessing quantitative dietary intakes of infants through 24hr recall, ii) 28-day food frequency questionnaires for mothers or other caregivers, iii) household observations on feeding styles, mealtimes, snacking, and iv) in-depth interviews with maternal and other caregivers.
 - examine IYFC practices in the context of health services and day care facilities to understand feeding styles and food consumption practices.
 - review the development and implementation of policy on IYCF in relation to over- and under-nutrition. The project will review research to identify challenges in adopting healthy feeding practices in the two distinct settings.
- Work package 2 consists of a community-based participatory design process, which entails:
 - workshops with stakeholders and end-users (including caregivers and families, health professionals, local government) to identify challenges faced in IYCF;
 - workshops to generate ideas and design prototype interventions to address the challenge of micronutrient deficiency and obesity among infants and young children.
- Work package 3 aims to:
 - develop pilot interventions in households, communities or government health facilities.
 - conduct a qualitative evaluation of the pilot, and then discuss findings in reflective workshops with researchers, community stakeholders and government officials.
 - Activities also include stakeholder engagement throughout the lifetime of the project, including forming stakeholder panels at the start of the project and consulting them at regular intervals.
 - The project will also disseminate findings with academics, health professionals, policymakers at the local and national levels and health service providers.

Expected Outputs:

- The project will publish its findings in open access journals, contributing to the evidence base on nutrition transition in middle-income countries.
- policy briefs for government ministries and partners, highlighting opportunities for preventing malnutrition and promoting healthier feeding.
- participating universities and partner institutions collaborating on the project will showcase key research findings through articles on their websites, social media and press releases.

- training and coaching opportunities in innovative research methodologies such as running participatory workshops will also arise through the project, providing opportunities for early career researchers.

Expected Outcomes:

- stronger evidence on the socio-cultural, behavioural and environmental influences that influence nutritional and feeding practices for infants and young children integrated into health policy and practice.
- greater capacity among local partners to use participatory approaches to improve IYCF interventions.
- empowerment of local communities through involvement in research activities including the design and testing of interventions.

Expected Impact:

- better complementary feeding practices in the areas where pilot interventions are carried out, and among the wider population as successful practice is more widely disseminated.
- in the longer run, reduced malnutrition for infants and young children in Peru, reduced disease risk of disease and better long-term health outcomes for the population.

5.1 Emerging project results

Relevance of Newton Fund activities

ODA relevance

In tackling malnutrition and seeking to improve policies focusing on infants and young children the **project aligns closely with the UK's ODA priorities**. Optimal feeding of infants is critical for healthy growth and development and to prevent a range of health problems later in life. To this extent the project contributes directly to Sustainable Development Goal 2 on reducing hunger and ensuring children get sufficient and nutritious food. It also contributes to Sustainable Development Goal 3 on ensuring healthy lives and wellbeing.

Relevance to Peruvian priorities

The **research collaboration is highly relevant to health and broader development challenges in Peru** and to the Peruvian government's policies in response to those. In recent decades, Peru has experienced rapid change due to economic development, migration to cities and new dietary habits. This has brought with it a double burden of malnutrition in terms of micronutrient deficiencies in anaemia and childhood obesity.

In the last decade, overweight and obesity levels have increased among children, adolescents and adults alike. A widespread issue is that infants and young children aged 6 to 23 months do not receive enough micronutrients, such as essential vitamins and minerals, particularly iron. Despite the provision of dietary supplements to women and young children through national health services, the prevalence of anaemia has remained broadly stable in recent years,

affecting 43.8% of infants and young children in 2017⁴⁰. In the same year, 15% of children under five years old and 62% of adult women were overweight or obese.

The Peruvian Ministry of Health has invested in national programmes to reduce anaemia and promote healthy complementary feeding practices. However, new and more holistic strategies are still needed as these programmes have not substantially reduced levels of anaemia. Aside from being a health challenge, this phenomenon has important socio-economic ramifications as it is it is mainly suburban households with lower socio-economic status that are at greatest risk of nutrient-poor, high-energy diets due to their affordability, palatability and ready availability.

Embedding project research within the health services and government facilities of the two suburban project areas is expected to bring benefits in terms of designing pilots that fit the local socio-cultural context, increasing sustainability by complementing existing services.

In September 2020, the two award holders were awarded additional Global Challenges Research Fund ⁴¹ / Newton Fund Agile Response funding to investigate the effects of COVID-19 on children's dietary pattern due to households' livelihoods, health conditions and the changing economic situation. This highlights relevance of the project as well as the strength of the research collaboration.

Origins and quality of the collaboration

The two PIs developed the project idea after attending a workshop organised by MRC and CONCYTEC in Lima in 2018. On the UK side, the focus area of the overall call was closely aligned with its existing work on NCDs. It also offered an opportunity for MRC to expand its scope of work to Latin America and away from traditional areas of focus. The subject also aligned closely with the Peruvian partner's research interests and recent experience.

The approach adopted by the Fund was praised as supporting collaborative and inclusive design, leading to relevant and appropriate research for the Peruvian socio-economic and political context. However, respondents noted that although the project has a good design, a longer inception phase would have allowed for more meaningful interaction with local research communities, leading to stronger connections and partnerships during the implementation phase.

Additionality

The Peruvian award holder reported that funding for nutritional research in Peru is quite limited. According to respondents, **it is unlikely that this project would have gone ahead through other funding**, at least in its current scope and size.

5.2 Effectiveness of Newton Fund activities

Emerging results

⁴⁰ Encuesta Demográfica y de Salud Familiar in Spanish, 2016

⁴¹ The Global Challenges Research Fund (GCRF) is a £1.5 billion initiative supporting research to address challenges in developing countries, paid for from the UK's aid budget.

The original schedule anticipated that the project would last until April 2022. Up to March 2020 (when fieldwork activities were interrupted due to COVID-19) all of the project's scheduled milestones had been met, and the project was on track to achieve its objectives.

It was possible to undertake much of the groundwork research and network-building for the before the pandemic. For instance, the team established links with policymakers through membership in working groups and committees, such as staff working at the Ministry of Health, the Department for Development and Social Inclusion, and regional organisations of the Fund to Stimulate Development Committee. This is likely to facilitate the dissemination of findings to the relevant ministries and government departments once more progress is made in research activities.

However, **most scheduled fieldwork activities have yet to be completed**. It has been possible to continue parts of the planned data collection process by shifting to phone-based interviews. Other elements that need to be carried out in person have (e.g. the quantitative survey of dietary intake) have been put on hold. Consequently, the project schedule has been substantially affected by the lockdown and other measures related to the COVID-19 pandemic.

Despite these delays, the team has made progress in several areas, including:

- working on several academic articles focusing on different components of the research.
- co-designing tools to influence behavioural change among health workers and mothers, including a digital app to monitor children's growth.
- producing initial guidelines on infant and child feeding for the Ministry of Health, informed by early research for the project. The ministry is currently reviewing these.

Going forward, the project will focus on knowledge translation outside academia and engaging with the key stakeholders identified to align the project to their evolving requirements.

Capacity building of the research team

While primarily a research collaboration, **the project includes an important capacity-building component**.

Three PhD students have also been involved in the project, with two of these expected to complete their thesis in this research area. Across the board, it was recognised that partners have learnt from each other. For instance, Peruvian team members noted that the UK team has brought useful experience in in data analysis and participatory research methods.

The research is also expected to inform curriculum development and hence to stronger training at the Universidad National Mayor de San Marcos and Universidad National Hermilio Valdizan, both of which are leading universities in Peru for nutrition and nursing.

Health staff participating in the two project locations are also benefiting through their involvement in the formative research and in the co-design process for intervention pilots. Interviewees highlighted that their participation in the project is likely to ensure research outputs are closely focused on their experience and needs.

Benefits for the UK

This was the first experience of working in Peru for the Latin America for the Loughborough University team and helped foster the creation of a community with researchers in the same field in Latin America. While the UK team had previously worked in a range of developing countries in Asia and Africa through the GCRF, participation in the Newton Funding has created **an opportunity to apply research methods and interests in a new context**. It is also perceived to have promoted the department's visibility and reputation for research excellence.

Challenges in the collaboration

Interviewees from both countries report a positive overall experience so far. However, there are some areas for potential improvement.

One challenge mentioned by respondents is the **lack of clarity on the different Newton follow-up funding streams**. For example, it was reported that the difference between the Newton Prize and the Newton Impact Scheme is not clear to the award holders. It was suggested that merging an overarching fund could increase clarity and help facilitate applications for further financing – allowing award-holders to streamline their efforts towards one call rather than duplicate the work.

In terms of project durations, it was argued that three-year projects still do not allow for enough length or stability to carry out research to its full potential. Rather, collaborations of at least four years were viewed as having greater potential for impact.

5.3 Emerging signs of impact

It is too early to observe signs of impact, given that the project is not scheduled to complete before April 2022, even before taking into account delays resulting from the COVID-19 pandemic. **It is evident however that the project has strong potential for impact**, in that translation from research to improved policymaking is at the core of its activities and objectives.

Sustainability

There is evidence of strong consideration of sustainability issues throughout the design and implementation of the project, in particular:

- **The involvement of stakeholders from communities, and health services is integrated throughout the project.** There was also extensive dialogue and coordination with authorities at the local, regional and national level from the outset.
- Holding quarterly meetings with the **stakeholder panel** throughout the three-year project is a further mechanism that will help ensure that the research and project pilots respond to regional actors' priorities and align with their needs, increasing the likelihood of take-up. Interviewees also noted that the researcher's engagement with stakeholders will continue beyond the scope of the project through active contribution to advisory groups and committees on nutrition.
- **A large dissemination event** is also planned for academics, stakeholders, and partner organisations at the end of the project, as well as a regional dissemination event for relevant stakeholders in Huánuco. There are also plans for presentations for broader audiences including an interdisciplinary dissemination event at Loughborough University for academics, international experts on nutrition and global health, and government and non-governmental organisations.

Websites and social media channels at the universities and institutions involved in the project are also expected to aid in showcasing published articles, presentations, press releases and project activities as the research advances. This will encourage engagement with the project and support the integration of findings into broader policy later down the line.

Complementarity and coordination

There are also some positive signs of the project **complementing and coordinating with other activities in the same field**. In addition to the discussions with the Ministry of Health, regional and local government officials already mentioned, the research team is also engaging with **UNICEF Peru**, which has expressed its commitment to applying research findings for advocacy initiatives.

Coordination with others working in this space is facilitated by the research team's active involvement in multi-sectoral government partnerships in Peru. For example, two research team members are currently providing consulting services to the National Centre of Nutrition and Food for the planned revision of feeding guidelines for children under two years of age, ensuring that research findings directly inform policy.

5.4 Conclusions

- The project is ongoing and also delayed by the pandemic, so it is currently too early to observe any tangible signs of impact on policies or practice. **There are however promising indications that objectives will be achieved in due course.**
- The project's research focus is **timely and well-aligned with the Ministry of Health's plans**. Plans to work closely with policymakers were included from the outset, with ongoing contributions to the development and implementation of new policy and guidelines on infant and young child feeding.
- Outputs achieved so far include papers focusing on different components of the research, co-designed outputs to influence behavioural change with nutritional staff and mothers, tools to monitor children's growth, and documents to be shared with local stakeholders.

Lessons learned

- **This research collaboration is centred around its participatory approach.** Continuing engagement with end-users as co-producers of solutions increases the chance that contextually appropriate and tailored pilot interventions will be developed. This can help increase sustainability by fostering ownership, on the ground change and take-up of innovative practices. Engaging meaningfully with local communities throughout the research can also have important empowerment implications. Placing mothers, caregivers, and health workers at the centre of the policymaking process will help generate products and services relevant to them and ensure local voices are heard.
- **There is potential for further relevant collaborations which draw insights from other countries in the region as well.** In future phases of the Fund or similar collaborations, there could be potential to organise thematic calls which bring a regional perspective and cross-country learning while also allowing AHs to strengthen their regional networks and partnerships. Future collaborations could consider having longer inception phases to allow for partnership-building; this is especially important where different country partners have not worked together before.

6 Project: Novel approaches to understand the state of biodiversity and support livelihoods

Summary

<p>Project title</p>	<p>Novel approaches to understand the state of biodiversity and support livelihoods: the distribution and degradation levels of <i>Mauritia flexuosa</i> stands in Amazonia</p>
<p>Call title</p>	<p>Institutional Links 7</p>
<p>Short description</p>	<p>The project aimed to introduce unmanned airborne vehicles (UAVs) as a tool for gathering data on the <i>Mauritia flexuosa</i> – commonly known as <i>aguaje</i> – a palm species abundant in the wetlands of the northern Peruvian Amazon. The trade in fruits of this species is important for the local and regional economy, and there is interest in exploring its potential for export to international markets.</p> <p>The project tested methods using high-resolution optical data to map the distribution and degradation levels of stands of <i>Mauritia flexuosa</i>, through a combination of UAV imagery and forest plot data.</p> <p>The approach and results have been transferred to partners through the training sessions and workshops, including the national government, NGOs and local companies, all of which are actively working with communities to promote sustainable fruit harvesting.</p>
<p>Objective(s)</p>	<p>The project aimed to map out and analyse forest degradation, particularly of the <i>aguaje</i> plants. It aimed to foster an environmentally sustainable increase in palm tree cultivation areas, developing maps and setting out strategies to limit forest degradation and promote more sustainable cultivation.</p> <p>The ultimate impact of the project is to:</p> <ul style="list-style-type: none"> • support long-term tropical forest conservation and protect biodiversity.

	<ul style="list-style-type: none"> support local livelihoods through sustainable fruit harvesting, thus raising incomes and reducing poverty.
Pillar	Research
Acton value (total budget allocated in country, in GBP)	UK: GBP 47,518 PE: n/a
Start/end date (Status: on-going or complete)	February 2019 to February 2020
DP UK and overseas	British Council (UK) CONCYTEC (Peru)
Award holders/ grantees	UK: University of Leeds Peru: Instituto de Investigación de la Amazonia Peruana

Description of the project

The project was funded under the Institutional Links call, a programme run by the British Council, in this case in partnership with CONCYTEC. Institutional Links provides grants supporting research and innovation collaborations between the UK and partner countries, including (but not exclusively) through the Newton Fund. Under the Newton Fund, Institutional Links grants support research that tackles local development challenges such as extreme weather conditions, access to affordable health care, food and energy security.

The project was a one-year collaboration between the University of Leeds and the Instituto de Investigación de la Amazonia Peruana (IAPP). The collaboration focused on introducing UAVs i.e. drones to quantify natural resources in the Amazon. It aimed to map and systematise knowledge on the *aguaje* palm in the Loreto region, working with six communities.

Pathway to impact

As shown by Annex 3, Figure 7, this project fits within the Theory of Change for Newton Fund Research Pillar of activities. As shown in the figure, the partnership consists of the following:

Activities:

- data collection through the use of drones to collect images to map the *Mauritia flexuosa* palm species.

- organisation of project meetings with potential users – specifically the Peruvian Protected Areas Authority (SERNANP) and RAF SAC, a fruit harvesting company, to map the economic usefulness of the *Mauritia flexuosa* palm species.
- organisation of project workshops with potential users from the six communities on how to fly UAVs, map the palm species and analyse the data.

Expected outputs:

- creation of a mapping system accessible through open-source software, leading to the production of maps to help local communities rapidly understand the availability and quality of potential crops.
- academic publications.
- dissemination efforts through presentations delivered at conferences and public events.

Expected outcomes:

- capacity building for three students, after completing their theses on the project and being trained in its methodology.
- further application of the project methods by SERNANP and RAF SAC, as well as local NGO Amazónicos por la Amazonia (AMPA) to map the availability of the palms and the communities where they work.
 - As SERNANP has a statutory duty to monitor the impact of extractive activities, such as fruit harvesting in protected areas, the outputs from this project are expected to meet its need for cost-effective, landscape-scale monitoring of local biodiversity.
 - The project team hopes that the project's research methods can be applied by NGOs as well. For example, through engagement with AMPA, it hopes to foster the application of project findings to local communities engaging in fruit harvesting, improving the organisation's monitoring techniques, and leaving them better placed to obtain funding from donors.
 - RAF SAC may also benefit from the project by potentially expanding its commercial network. It can use the new monitoring techniques in the targeted communities – and their environmental implications – to negotiate a premium price on *aguaje* with buyers, thus leading to economic benefits for these communities.
- Local communities gain the ability to manage resources sustainably, employ resources more effectively, and share good practices with others.

Expected Impact:

- It is expected that the project will increase the ability of community harvesters to locate viable crops, harvest fruit sustainably and protect local biodiversity.

6.1 Emerging project results

Relevance of Newton-Paulet Fund activities

Activity targeting and ODA relevance

The sustainable exploitation of biodiversity is key to long-term tropical forest conservation and local livelihoods. By generating new data and evidence on tree distribution and resource availability, the project aims to protect natural resources and at the same time, support the harvesting of *aguaje* fruits using traditional methods. This has both environmental and socio-economic implications.

In doing so, the collaboration fits well with Newton-Paulet Fund priorities in Peru, particularly with Priority 3 on biodiversity and unique geography. The collaboration has a strong translation ambition – namely, applying science to contribute to remote communities' economic development. More broadly, it fits into the UN's SDG framework, particularly Goals 12 and 15, on responsible consumption and production and life on land, respectively.

Relevance to Peruvian priorities

In Peru, the fruit from the palm *aguaje* is a traditional product employed among indigenous communities in the Amazon for subsistence and commercial purposes.⁴² *Aguaje* is important for daily use among local communities, as it is naturally abundant and can be harvested using traditional methods. The commercial extraction of the fruit from this palm provides an important income source for rural communities and urban communities nearby.

However, the destructive nature of harvesting has caused significant over exploitation and degradation of naturally occurring *Mauritia flexuosa* palm swamps, leading to a reduction in trees. The destructive nature of harvesting processes undermines the economic potential that *aguaje* holds for rural communities and disrupts many ecological patterns and processes⁴³. If managed sustainably, *aguaje* could instead be used by the population for commerce and income generation. For example, the sale of value-added products such as ice creams or juices, sold in cities and other regions, holds economic potential for local communities and could support development efforts in the Amazon region.

A key challenge for the promotion of sustainable forest management has been limited data; particularly, difficulties in mapping biodiversity resources – such as the distribution of trees that produce economically important fruit – with high precision and at a large scale. Typical ground-based surveys only sample small areas, whilst management decisions require precise information on the health of the resource at scales of tens to hundreds of hectares. This is where the use of technology – in the form of UAVs – can help provide critical data. Developing a mapping system to analyse the degradation of the plants can ultimately increase palm tree cultivation areas, aid in setting out a strategy to limit forest degradation, and thus promote more sustainable cultivation.

Additionality

There is evidence of additionality in the design and running of this call. During the call design phase, the team organised a workshop for researchers from the UK and Peru to develop joint research proposals. The Peruvian and UK institution had already worked together in the

⁴² Gilmore et al. (2013). 'The socio-cultural importance of *Mauritia flexuosa* palm swamps (aguajales) and implications for multi-use management in two Maijuna communities of the Peruvian Amazon'. *Journal of Ethnobiology and Ethnomedicine*. 9:29.

⁴³ Gilmore et al. (2013). 'The socio-cultural importance of *Mauritia flexuosa* palm swamps (aguajales) and implications for multi-use management in two Maijuna communities of the Peruvian Amazon'. *Journal of Ethnobiology and Ethnomedicine*. 9:29.

past. Through this workshop, the teams again connected and started devising their research idea, which they further built on throughout the collaboration.

It was argued that the Fund has added value in several ways. First, the actual financing of the project, which made collaboration possible. Second, it brought together high-level international researchers and local researchers who have an in-depth understanding of their context. Finally, joint work provided access to new networks and the possibility of sharing findings among a broader audience of academics and policymakers.

6.2 Effectiveness of Newton-Paulet Fund activities

All project activities were completed by February 2020, within the planned timeframe. Participants interviewed for this case study report that the project was managed effectively.

The main outputs from the project are as follows:

- **Production of *aguaje* 12 resource maps for half-hectare segments of terrain in six different regions** using data collected by drones.
- **Production of a journal article** setting out the use of the innovative research methods and findings⁴⁴, with another article currently in production.
- **Capacity building opportunities, including networking and training** in the use of the technology and equipment for staff from both sides of the partnership. The Peruvian AH provided technical knowledge and training on UAV technology, with training for one early career researcher at the Research Institute of the Peruvian Amazon trained in UAV data collection, and three others trained to analyse the data.
- **Presentation of findings at an international conference in Madagascar**, to professional practitioners and postgraduate students.

Quality of the research collaboration

Overall, the research collaboration quality was considered good. The collaboration builds on a long history of partnership between the University of Leeds and IIAP, which was further strengthened through the project. The project also facilitated collaboration with the University of St Andrews and the Tropical Wetlands Consortium.⁴⁵

There were no reports of any issues working with UK partners. However, there were some budget challenges on the Peruvian side related to delays in receiving funds in time to begin the fieldwork. This caused stress for the Peruvian team but did not ultimately delay the fieldwork.

Overall, the collaboration has sparked interest in the academic community – both national and international – with two MSc theses now being undertaken, building from the project's work.

Benefits for the UK

⁴⁴ Casapia et al (2020). Identifying and Quantifying the Abundance of Economically Important Palms in Tropical Moist Forest Using UAV Imagery. *Remote Sens.* 12, 9.

⁴⁵ Additional information at Tropical Wetlands Consortium (2021). Available at: <https://tropicalwetlands.wp.st-andrews.ac.uk/en/members/>

It was not possible to interview staff from the UK award holder to assess the benefits for the UK in detail. There were however clear benefits for the research team from Leeds, including the opportunity to research and publish in a new field, the development of networks and relationships that will promote future collaboration.

Translation of research into policy

While the project did not aim to contribute to changes in policy, it **has made good progress in both in disseminating research and in providing practical training for local stakeholders.**

Project workshops were held on how to fly UAVs to collect images to map the palms as well as how to analyse the collected data. The drone workshops were held both at community and institutional level and included a wide range of stakeholders including private companies (in particular the RAF SAC fruit harvesting company), governmental agencies (SERNANP), NGOs, students, and local communities.

Additional benefits

An additional potential impact of this research is on women's empowerment and economic independence and challenging gender norms. In particular, *aguaje* cultivation and harvesting are typically male dominated, as is the research field. However, anyone who can manage the equipment could work in this field, and the leading role of the female Peruvian PI in particular challenges gender norms about working in this field.

6.3 Emerging signs of impact

There is some evidence that the methods for locating and mapping palms trialled in the project are starting to be used more widely. For instance:

- **SERNANP is now using methods developed by the research team to monitor protected areas as well as the harvesting methods** utilised by local communities. This has potential to inform policymaking and protection efforts for local flora and fauna.
- There is also some evidence the project has built capacity and raised awareness in local communities on the need for more sustainable harvesting of the *aguaje* fruit. Local communities were receptive to the need for more sustainable harvesting practices, **and very interested in the methodology and training.** There were also requests for additional workshops on this subject (though it was not possible for the project team to deliver these given limits on time and funding).
- There has also been interest among local communities and organisations in purchasing UAV technology, though this is likely to require further grants given the cost.

Signs of sustainability

There are positive signs of sustainability of this project, both in terms of the research collaborations created and up-take-up among local partners.

In terms of the sustainability of the collaboration, **the team applied for additional funding under the Newton Fund Impact Scheme** to carry out more workshops and capacity building at the community level. While this was unsuccessful (apparently due to a technicality i.e. missing documents) the team is monitoring potential opportunities.

The research team is also continuing to engage through other initiatives, in particular:

- One of the AHs was invited to join the Technical Advisory Committee for the BEIS **Partnerships for Forests programme**. There are also **ongoing discussions to develop the market for sustainable palm fruits** in the Peruvian Amazon under the same programme, with involvement of the multinational drinks company, AJE.⁴⁶
- **The team is also preparing a new bid with SERNANP** for the Green Climate Fund for ongoing forest monitoring in the Peruvian Amazon up to 2030. The species-level UAV mapping methodology piloted in the current project is a key element in this new proposal.

While dissemination has been carried out with local partners, further work to promote sustainability of the results could usefully be undertaken with national authorities to promote use of the same approach in other settings. For example, CONCYTEC has expressed a strong interest in working on agroforestry issues with the UK. The innovative methods and findings from the current project could support this.

Complementarity and coordination

There was strong coordination with a range of stakeholders at local level during the project, with the team working closely with government, NGO and private sector actors.

A range of opportunities for complementarity and coordination are also opening up through ongoing discussions with a number of national and international partners.

There have already been discussions of the project and its use of UAV data to map palm populations with BEIS' Partnerships for Forests programme. As part of this initiative, the research team has provided technical inputs on how to monitor the health of the populations of palm trees using the methods developed in this project.

6.4 Conclusions

- **This research project successfully piloted an innovative approach** to assessing forest degradation and sustainable harvesting, using UAV technology to map forest resources in six communities.
- **The project has important potential implications for efforts to preserve the biodiversity of the Peruvian Amazon**. It could also help generate economic opportunities among rural communities, particularly if more sustainable *aguaje* products can be marketed at the national and international levels.
- Project activities were completed as planned, and the **research has resulted in publications, workshops and engagement with local partners and the community**. The project also met with high interest due to the innovative research methods employed, which are now being used at local level in the region and with grant bids in place to transfer their use to other settings.

Lessons learned

⁴⁶ AJE (2019) formerly known as Ajegroup: Available at: <https://www.euromonitor.com/aje-group-in-soft-drinks/report>

- **The project has been successful in illustrating innovative options for forest conservation and resource management.** It has the potential to raise awareness around biodiversity issues and increase appreciation and understanding of traditional cultivation methods and their dual potential for income generation and conservation.
- **The lack of a specific technology transfer component limits the possibility of take-up for low-income rural communities or NGOs which may have other funding priorities.** There are barriers to further applying this methodology, which ultimately relies on the availability of technological hardware and achieving scale in the absence of specific interventions or additional support. Without additional investment, it risks remaining an experiment rather than a sustainable policy solution.
- **While the project was implemented with extensive engagement at the local level, there is potential for additional engagement with national partners.** There is scope for extension projects to work further with national-level institutions and policymakers so that findings can further inform research initiatives and interventions.

Annex 1 – Methodology

Research methods and data collection approach

The thematic impact studies are central to our Final Evaluation approach and involved an intensive period of remote research by the evaluation team members.

Preparation for the research included a document review of country-specific documents on the Peru research and development context. Documents reviewed include the evaluations Peru Baseline and End line Reports, Mid-Term Thematic Impact Report, and the updated Country Situation Note. We also conducted a literature review of additional documentation on Peru's science and innovation landscape, and previous UK- Peru collaboration activities. Project-specific documentation, such as application forms, progress, and final reports, were reviewed for each action included in the study, where provided by the Delivery Partner, local partners or researchers.

The document review was accompanied by **remote research with respondents in Peru and the UK** in September and October 2020. Three main categories of stakeholders were interviewed: i) in-country UK representatives and Newton Fund in-country team; ii) UK and local funders; and iii) participating researchers. In some cases, additional university staff, such as university leadership or other research teams, were also interviewed.

Our data collection was complemented by an analysis of the pathway to impact for each action, which can be found in Annex 4. Here, we analysed each project's trajectory to impact by placing it within the Newton Fund Theory of Change. This allowed us to visually represent the pathway to outputs, outcomes, and impact of each activity, and highlight its (potential) contribution to broader Newton Fund goals.

Limitations of the research approach

Case studies were limited to three projects per case study, which were conducted remotely owing to the Covid pandemic. In some projects, the added logistical challenge of remote research limited the number and range of stakeholders consulted. The volume of documentation provided varied by project, thus limiting the possibility of triangulating findings. The case study findings reflect the data provided by each project and what is available online. The case study is not representative of all Newton Fund activities. Whereas it provides valuable depth and illustration of Newton Fund activities, the case study alone does not provide generalisable evidence.

Research findings have been triangulated across different stakeholder groups and various sources of documentation (project documents and online resources such as the Research Council UK Gateway to Research portal). However, the research team could not independently verify statements by all the different contributing stakeholders or verify what was reported in the documentation.

Additionally, the COVID-19 pandemic resulted in the need to revisit our data collection approach, particularly in terms of our 11 country case studies. The case study research was originally scheduled to take place in three waves of partner country visits between March and August 2020. The inability to travel internationally and the closure of offices, embassies,

universities, and research centres required switching to a **remote-based approach**, as agreed with BEIS in March 2020.

In revising our case study approach, we recognised that switching to a remote-based approach would have likely implications on the quality of data collected, as outlined in our April 2020 Concept Note. The quality of interviews could have been affected for several reasons, including:

- problems with connectivity, technical issues and limited telephone or internet coverage, which posed the risk of lowering the quality of calls and cause loss of rapport, creating abrupt feelings in interviews and affecting the depth and quality of our findings.
- the absence of visual or nonverbal cues, inability to observe behaviour and body language, with the risk of telephone interviews becoming mechanical and cold.
- having little opportunity to establish rapport with respondents and having potentially shorter times for interviews as respondents may more easily become fatigued by telephone compared to face-to-face interaction.
- limited engagement, low response rates and little interest in participating in our research, which might limit the breadth and depth of our findings.
- the inability to visit laboratories or facilities, and limited scope for unplanned interviews with additional staff members, researchers, or others in the same institution.
- fewer opportunities for check-ins and informal conversations with in-country teams (ICTs), who are a rich source of data.

We mitigated these issues in several ways, where:

- we included additional time for document review prior to interviews so that conversations moved on to speaking about results, emerging impact, and challenges (to take into account for shorter interview times and potentially lower quality interviews). However, it is important to consider that availability and quality of project data and information varied considerably across sampled interventions.
- we favoured video interviews wherever possible to limit the lack of nonverbal cues and to help establish rapport with respondents.
- we had several email exchanges prior to interviews to create an initial connection and rapport with participants, and to set out the objectives and areas covered in the interviews by sharing topic guides prior to our calls.
- we organised follow-up interviews wherever possible to fill any remaining information gaps brought about by having shorter interview times. We also gathered interviewee insights on additional respondents and carried out additional interviews which emerged from email exchanges and interviews.
- we organised regular check-ins with ICTs via email or telephone and delivered online presentations and validation sessions with each ICT to share emerging findings after having carried out all interviews. This allowed us to ensure we had accurately reflected the Newton Fund's experience in each country.

Annex 2 – Case Studies Sampling Overview

This Annex summarises the sampling approach used for the country case studies which inform the Final Evaluation of the Newton Fund. Detail on the approach and criteria used to develop the sample for the case studies is annexed to Tetra Tech’s Newton Fund Final Evaluation Report.

Final evaluation country sample

A total sample of 11 countries with three calls per country (totalling 33 calls) was agreed with the Department of Business, Energy, Innovation and Science (BEIS).

The countries selected for the country sample were China, Malaysia, Chile, Turkey, South Africa, Brazil, India, Philippines, Jordan, Peru and Kenya. The sample includes three additional countries (Jordan, Kenya and Peru)⁴⁷ due to the Newton Fund’s expanded scope. Six of these countries were included in the Mid-Term Evaluation (MTE)⁴⁸ of the Newton Fund case study research.⁴⁹

The criteria used for the country selection were:

- coverage of all regions covered by the Newton Fund.
- coverage of different levels of existing innovation and capacity of partner countries (as defined by the 2015 Global Innovation Index rankings and BEIS’ initial assessment of capacity).
- learning opportunities from new ways of working regionally in countries that either graduated from the DAC list or have ODA sensitivities; or operating in/ recovering from crises.
- the inclusion of Peru, Jordan, Kenya (countries that have not been explicitly included in the evaluation scope until now).

Non-selection of countries (or calls) does not reflect significance, quality or importance.

Proposed sample of calls and projects

Data from BEIS’ Newton Fund Activity Tracker (January 2020)⁵⁰ enabled the evaluation to determine ‘call’ activity and identify three ‘calls’ per country, giving a total of 33 calls in the sample. The following criteria were used to develop the call sample:

- ensuring coverage of all DPs.
- ensuring coverage of the three different pillars.
- reflecting emphasis on spending/thematic priorities in each country.
- allowing for longitudinal analysis by including six projects analysed as part of the MTE.

The outcome of the call sampling approach allowed for the identification of specific projects under each selected call. This was achieved in consultation with DPs, BEIS ODA Research and Innovation and ICTs.

⁴⁷Jordan, Kenya and Peru were not included in the MTE data collection, as they had just joined the Newton Fund. BEIS agreed to carry out in-depth case studies in the three new countries to ensure coverage of activities there.

⁴⁸ Mid-Term Evaluation of Newton Fund (2018). Accessible [here](#).

⁴⁹ These were: China, Malaysia, South Africa, Brazil, India and the Philippines. Mexico and Egypt, which were part of our MTE sample, have been replaced with Turkey and Chile respectively to increase opportunity for learning.

⁵⁰ The BEIS ‘Activity Tracker’ is an Excel-based internal monitoring tool by BEIS and updated quarterly by the UK Delivery Partners.

The project sample allows for coverage of all DPs and pillars within the Newton Fund portfolio. Six projects were analysed as part of the MTE and again at Final Evaluation to allow for longitudinal analysis. The sample list of 33 calls and projects is annexed to Tetra Tech's Newton Fund.

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Institutional Links 7

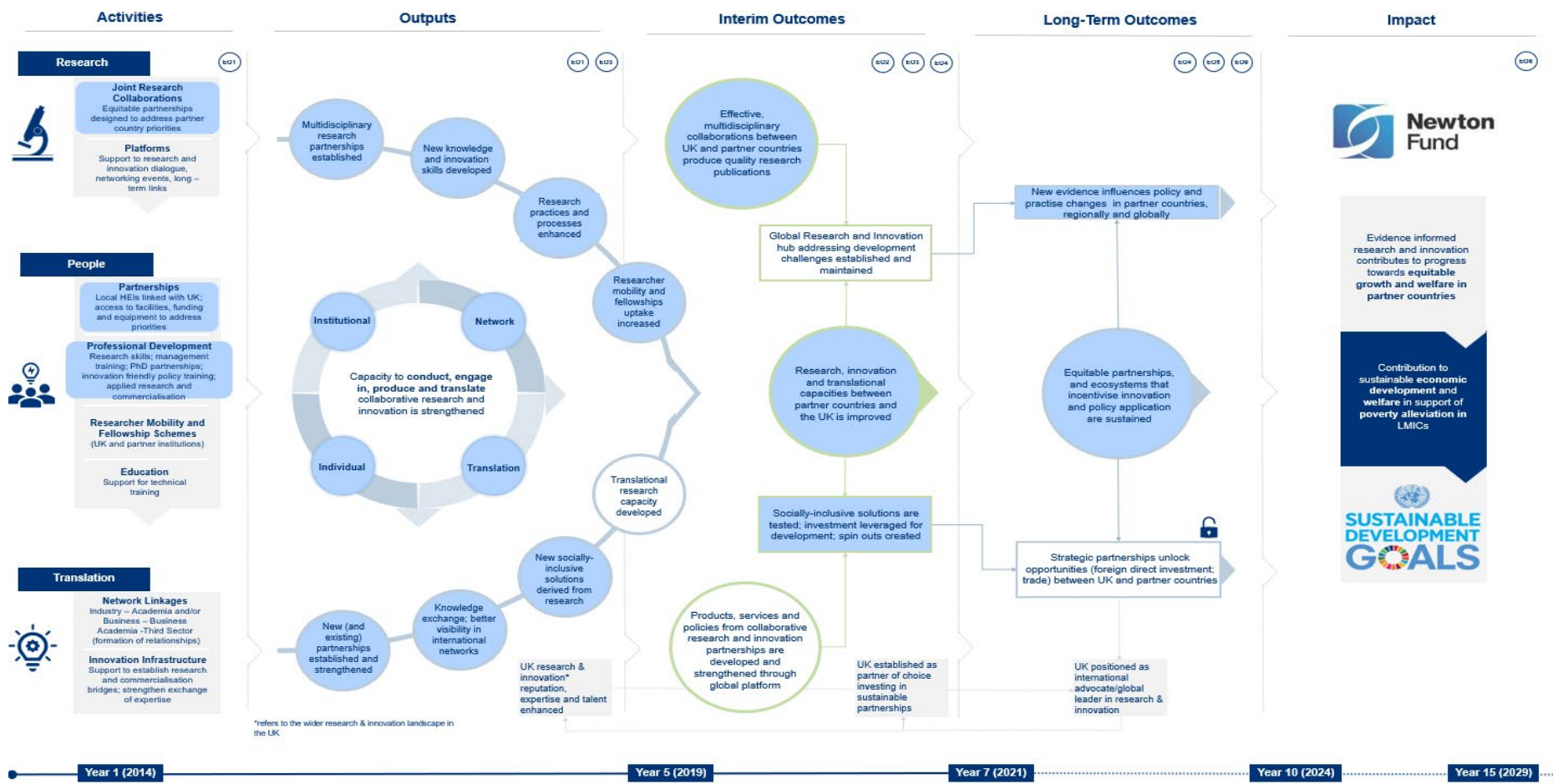
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Annex 4 – Theories of Change per Action⁵¹

Figure 5: “CASCADA: Toxin or Treat?” Theory of Change



⁵¹ The figures present the pathways to impact for the three projects reviewed in this case study, set within the overall Newton Fund theory of change. Specific pathways to impact for each project are indicated by the blue shaded shapes in each figure.

Figure 6: UK-Peru Relationship between Food, Nutrition and Health - Theory of Change

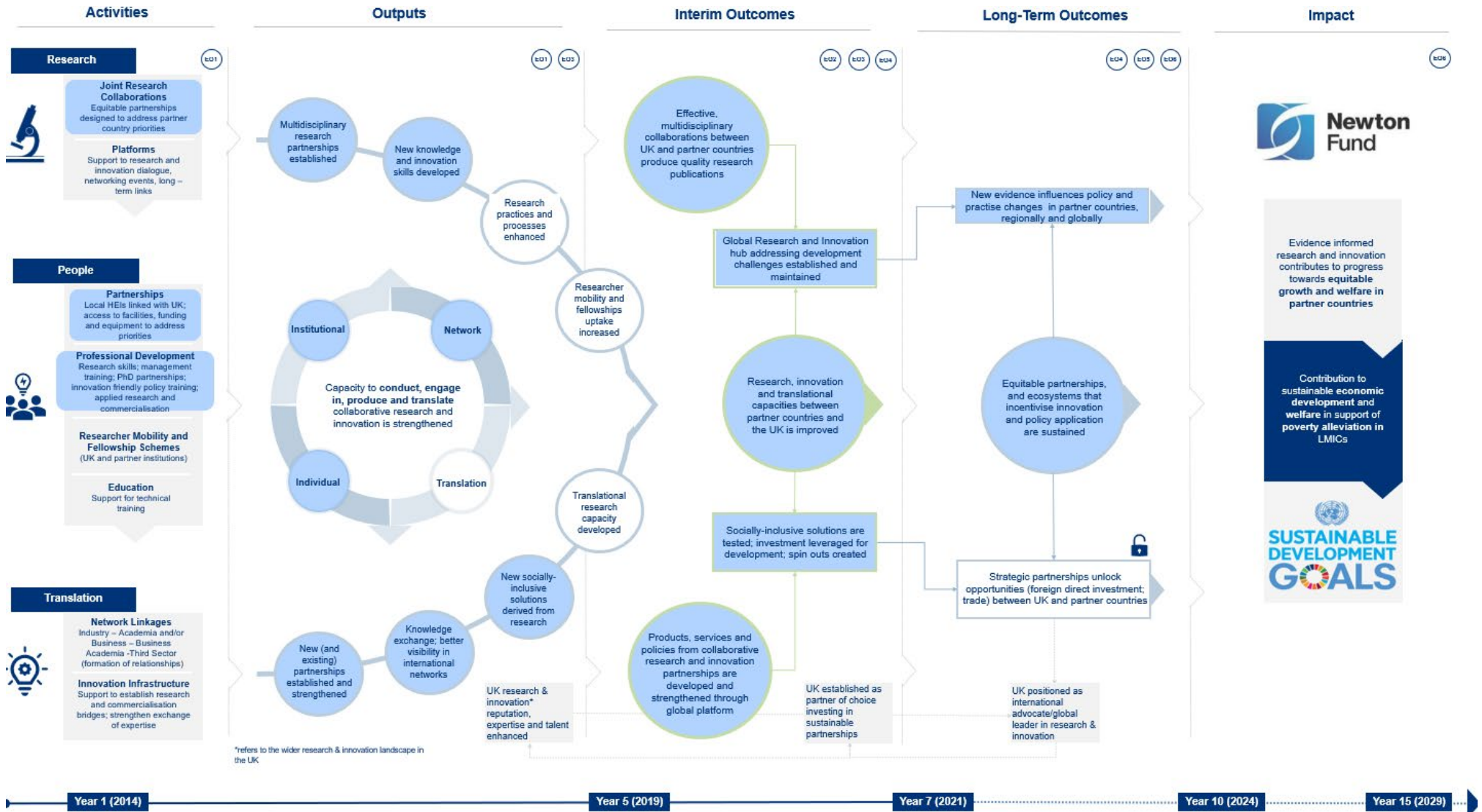
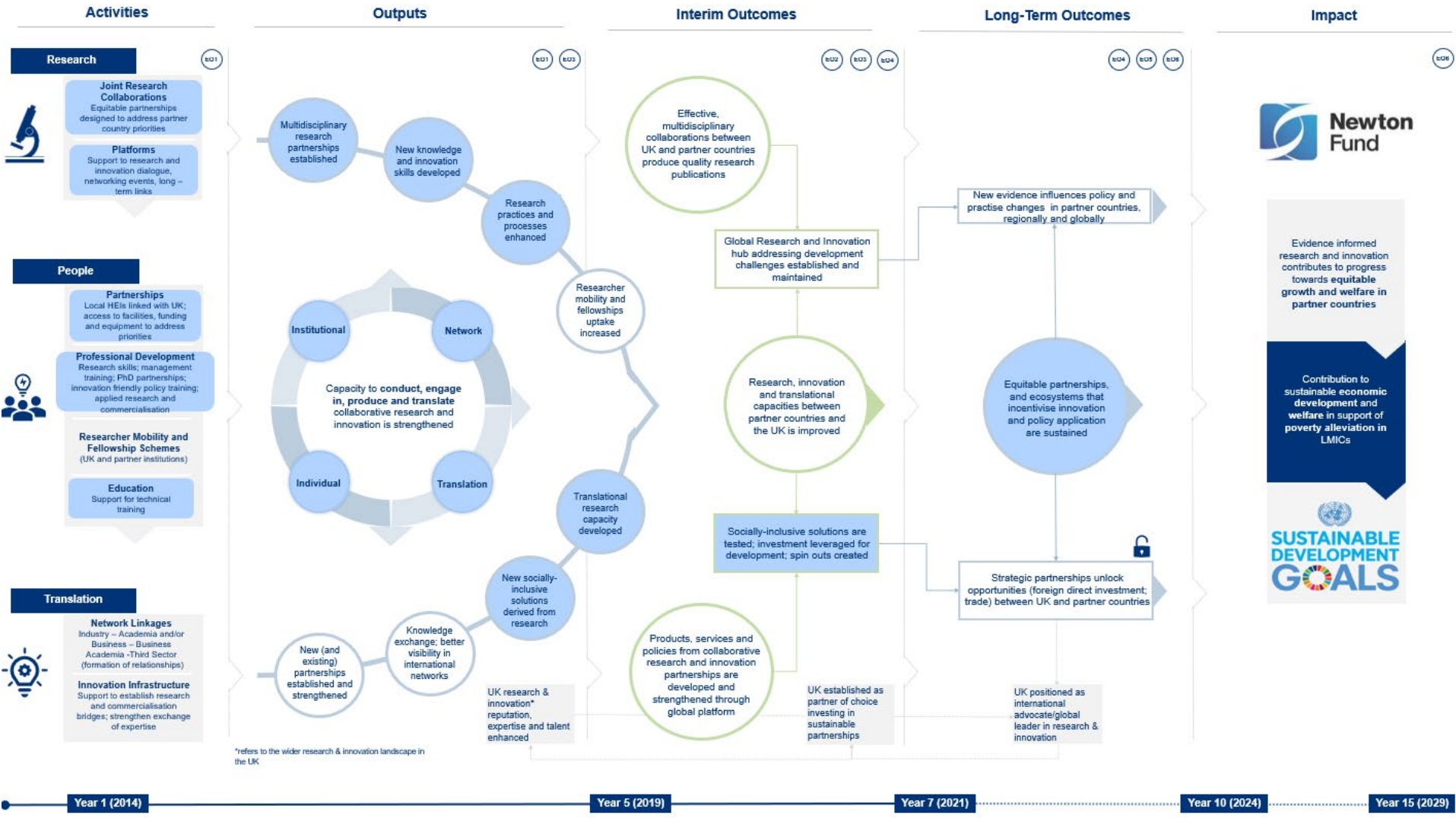


Figure 7: Institutional Links 7 – Theory of Change



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