Connecting research, policy and people, globally

University of Kent

UNIVERSITY OF CAMBRIDGE

EVIDENCE-INFORMED DECISION-MAKING FOR SUSTAINABLE DEVELOPMENT IN UZBEKISTAN: SPATIAL DATA

GCRF COMPASS Policy Paper

Sinead Mowlds

8 February 2021

GCRF COMPASS: Comprehensive Capacity-Building in the Eastern Neighbourhood and Central Asia: research integration, impact governance & sustainable communities (GCRF UKRI ES/P010849)

GCRF
UK Research and Innovation
ADA
BELARUSIAN STATE UNIVERSITY

Table of Contents

Author:
Sinead Mowlds

Authors' Information

Sinead Mowlds, Consultant and Research Affiliate, Cambridge Central Asia Forum, Jesus College, University of Cambridge and COMPASS Affiliate, Centre of Development Studies, University of Cambridge. Since 2007, her research has focused on food and nutrition security for rural and marginalised people. Her research aims to understand how complexity sciences can be applied to policies relating to food systems and climate justice. As independent consultant working with international organisations, NGOs, and the private sector, she's developed monitoring and evaluation frameworks, managed the launch of an open-sourced knowledge-sharing online platform and contributed to UN evaluations and reports. She's worked as Expert for the EU Economic and Social Committee's Rapporteur on climate justice and for the European Commission in assessing citizen-driven food system projects in European cities. As Research Affiliate with the Cambridge Central Asia Forum, she leads and contributes to research to identify tools, policies, and strategies to bolster environmental, agricultural, and collective action across Central Asian countries.
Contact email: sinead.mowlds@cantab.net

GCRF COMPASS project (ES/P010849/1, 2017-21) is an ambitious UK government capacity-building funding initiative, aiming to extend UK research globally and to address the challenges of growth and sustainability in developing countries. Notably, the COMPASS project led by the University of Kent, in partnership with the University of Cambridge, seeks to establish the 'hubs of excellence' at the top-level Higher Education Institutions in Azerbaijan, Belarus, Tajikistan and Uzbekistan, to enable them to become the centres for knowledge-sharing and transfer for *research integration, impact governance,* and *sustainable communities*.

EVIDENCE-INFORMED DECISION-MAKING FOR SUSTAINABLE DEVELOPMENT IN UZBEKISTAN: SPATIAL DATA

Executive summary

This policy brief provides a snapshot of the Uzbekistan's key development challenges and highlights how spatial data could help inform the country's development decisions. Spatial data can provide a clear visual for prioritisation and scenario-based planning. Mapping the risks associated with water insecurity can help provide an overview in the planning process, such as programmes and policies relating to disaster risk reduction and/or agriculture. Using regional data and modelling highlight the country's risk of potentially damaging and life-threatening river and/or urban floods occurring at least once in the next 10 years. The country's decision-making process could be enhanced by adding geo-localised targets based on spatial data, as well as its environmental commitments (e.g., biodiversity conservation and protection of the Aral Sea and communities).

***Keywords**: Spatial data, evidence-informed policy making, inclusive development, sustainable development, food and nutrition security, water security.*

***Abbreviations**:*
Nationally Determined Contribution (NDC)
United Nations Development Programme (UNDP)

Introduction

Since 2016, Uzbekistan has undergone a series of reforms. Their policy and decision-making processes are underpinned by an iterative process, i.e., each year, progress is reviewed and indicators are reset accordingly. When targets are reviewed, they're informed partially by consultations with ministers and their personnel, but their definition also relies on the input of the government's open data portal (discussed below). This iterative decision-making process allows for an adaptable approach to the country's transition from an inward focus to its position in broader regional and global contexts. Further, this approach is conducive to evidence-based policy-making as it provides space for engaging with a variety of audiences and embraces trial and error – two ways to promote the uptake of research evidence.[1] However, particularly in complex systems – such as ecosystems and food systems – the lag between research supply and policy questions demand, as well as the lack of good usable data proved barriers to the use of evidence in policy making.[2] Spatial data can help bridge the gap for some of these barriers, by providing real-time granular, and context-specific insights.

Policy context

Uzbekistan has developed several policies and strategies for the country's development which include commitments to sustainable development and which will require specific and robust land use planning. For example, the country's sustainable infrastructure plans include the: *Strategy for the Development of the Transport System until 2035, the Concept of Development of the Textile, Garment and Knitwear Industry 2020-2024, and the Concept of Development of the Hydropower Industry 2020-2024.*[3]

Uzbekistan's *Nationally Determined Contribution* (NDC) – a key global document in Uzbekistan's action against climate change - commits to reducing greenhouse gas emissions by 10 percent by 2030, relative to 2010 levels. However, a significant part of the NDC relates to climate change adaptation efforts, such as protecting communities from the adverse effects of climate change (extreme droughts and hydro-meteorological phenomena), agro and biodiversity conservation through sustainable infrastructure, and the protection of the Aral Sea and communities in the Priaralie region.

Uzbekistan's *Development Strategy Framework by 2035*[4] includes the development of agriculture (along with infrastructure and industry) as a key component of growth for Uzbekistan. The Strategy includes numerous agriculture-related targets, including:

---

[1] Mayne, R. et al (2018) Using evidence to influence policy: Oxfam's experience, Nature, Palgrave Communications 4 article number: 122(2018), accessed online on 8th February 2021: https://www.nature.com/articles/s41599-018-0176-7

[2] Rutter, J. (n.d.) Evidence and Evaluation in Policy Making: A problem of supply or demand? Institute for Government, accessed online 8th February 2021: https://www.instituteforgovernment.org.uk/sites/default/files/publications/evidence%20and%20evaluation%20in%20template_final_0.pdf

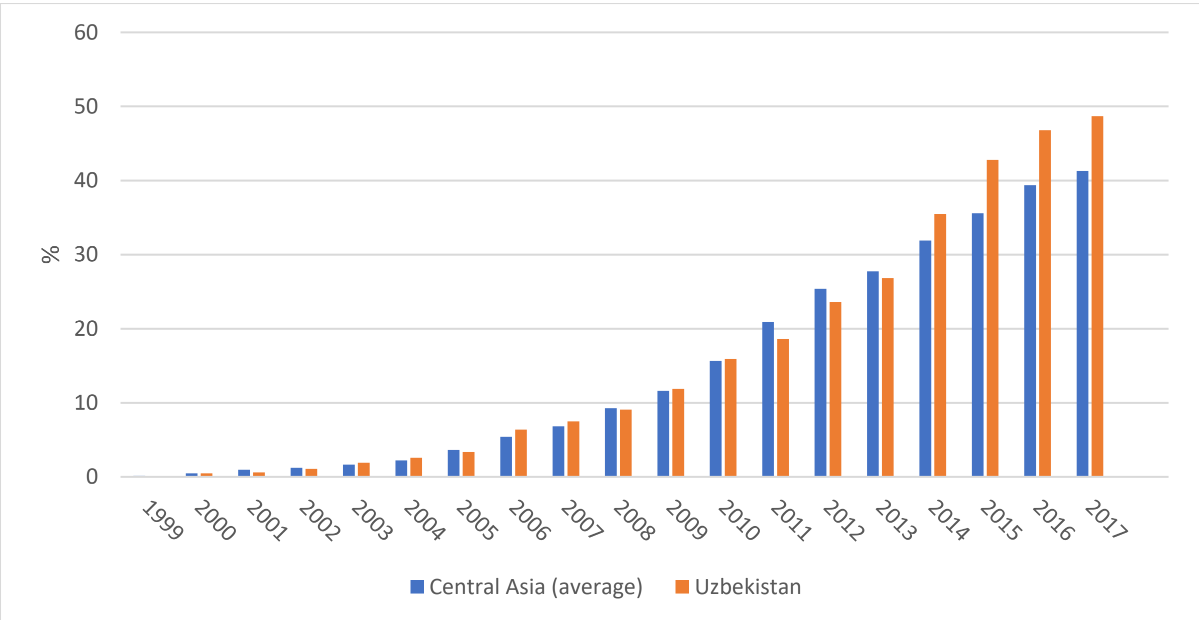
[3] OECD (2019): Sustainable Infrastructure for Low-Carbon Development in Central Asia and the Caucasus: Hotspot Analysis and Needs Assessment; Chapter nine: Uzbekistan's Sustainable Infrastructure Investments

[4] Ministry of Justice of Uzbekistan via Buyuk Kelajak, Development Strategy Framework of the Republic of Uzbekistan by 2035, accessed online 8th February 2021: https://uzbekistan2035.uz/wp-content/uploads/2019/05/%D0%9A%D0%BE%D0%BD%D1%86%D0%B5%D0%BF%D1%86%D0%B8%D1%8F-%D0%A0%D0%B0%D0%B7%D0%B2%D0%B8%D1%82%D0%B8%D1%8F-%D0%A3%D0%B7%D0%B1%D0%B5%D0%BA%D0%B8%D1%81%D1%82%D0%B0%D0%BD%D0%B0-ENG.pdf

- Reduce the annual water intake for agricultural needs from 90 percent to 70 percent by 2035, under the ‘dynamic’ scenario.
- Increase labour output (agriculture) and the depth of processing in agriculture, by 2030
- Agricultural automation by 2035
- Allocate 15 thousand hectares of production areas for the growing of chili peppers in the Republic of Karakalpakstan
- Extend production of traditional crops (local brands of pomegranates, figs, apples, peaches, melons, pears, radishes, and others) and new crops, such as olives
- Implement a five-fold increase in area for viticulture by 2023

Uzbekistan is already leveraging technology for evidence-informed and participatory decision-making, namely through the government Open Data Portal’s provision of national statistics and its feedback mechanism which promotes dialogue between the government and its citizens.[5] Although the country has seen steady growth in the percentage of the population using internet, World Bank data suggest that just 55 percent of the population used the internet in the three months prior to the survey, as per figure 1. Uzbekistan will need to build the national digital capacity to promote an inclusive digital transformation in the country. Further, differentiation needs to be made between building citizen digital capacity for ‘passive consumerism’ vs capacity to ‘enable content’.

Figure 1: Internet users in Uzbekistan (% of population)



Source: World Bank Data (https://data.worldbank.org/indicator/IT.CEL.SETS.P2?locations=UZ) [6]

Nonetheless, the country’s evidence-informed decision-making process could be expanded through the use and creation of spatial data. Satellite imagery provides both broad and detailed views of the Earth in real-time, helping to overcome some of the common time lags in classic data collection processes. Further, mobile applications and drones can strengthen the country’s

[5] Uzbek Open Data Portal: https://data.gov.uz/en/pages/about

[6] Central Asia grouping includes Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan. Latest available data for Kyrgyz Republic, Tajikistan, Turkmenistan were from 2017.

participatory processes, by enabling communities to map their knowledge of national ecosystems.

Specifically, spatial data can provide a sound basis for policymaking in complex situations. Ecosystems and agricultural systems, for example, operate within complex adaptative systems that interact with and influence each other. Nature exists and prospers in a complex system; dynamic, chaotic, and interdependent. Farmers and rural populations depend on nature and climatic conditions for their livelihoods. Yet, the behaviour of the whole system cannot be predicted by looking at component parts, and policy and planning need to reflect this complexity. Spatial data can help manage this complexity by providing reliable and timely information to decision-makers.

Uzbekistan will be implementing these shifts for economic growth and sustainable development in the face of pressing challenges, described in the following section. This policy brief provides a snapshot of the Uzbekistan's key development challenges and highlights how spatial data could help inform the country's development decisions.

Development challenges

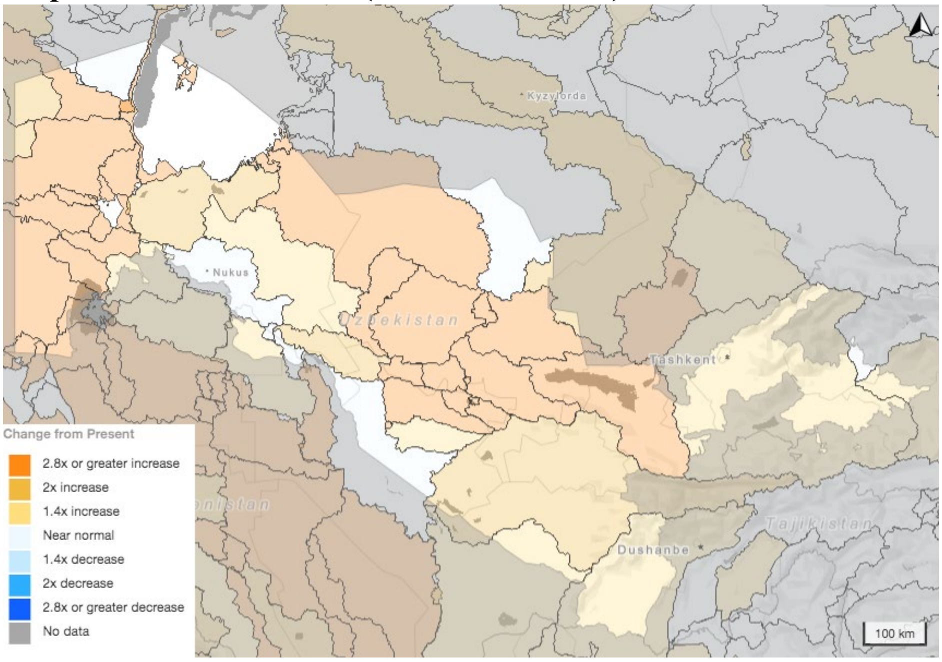
1. Water security

Challenges relating to water scarcity and quality, as well as the shared nature the country's resources with bordering countries are among the most acute for Uzbekistan. In 2018, the first Consultative Meeting of the leaders of Central Asian countries was held to approach intra-regional problems, of which water use has been longstanding, in a systemic and collaborative way.[7] Solving these environmental challenges will only be effective through intraregional cooperation.

Broadly mapping the risks associated with water insecurity can help provide an overview in the planning process, such as programmes and policies relating to disaster risk reduction and/or agriculture. Spatial data can provide a clear visual for prioritisation and scenario-based planning, such as using the Map 1 below, for example, showing the projected change in water stress for the coming decades under scenarios of climate and economic growth, modelling potential changes in future demand and supply of water over the next two decades.

[7] A. Rhakimov, U. Khasanov, A. Umarov (2020) New Foreign Policy of Uzbekistan: Central Asia, The EAEU and the BRI, GCRF COMPASS Policy Paper

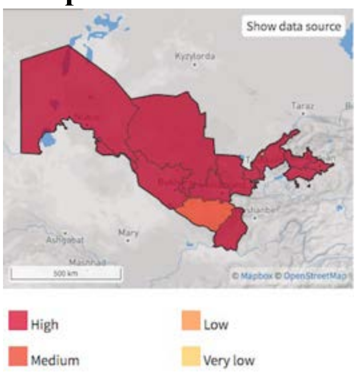
Map 1: Water stress 2040 (Business as Usual)[8]



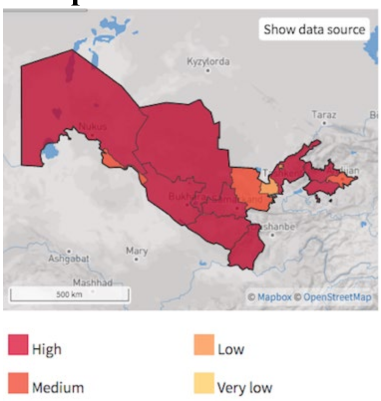
Source: UN Biodiversity Lab

Further, using regional data and modelling, Maps 2 and 3 below highlight country's high risk of potentially damaging and life-threatening river and/or urban floods occurring at least once in the next 10 years, and Map 4 shows a higher frequency of the events expected in the north western regions, where a drought is expected at least every 5 years.

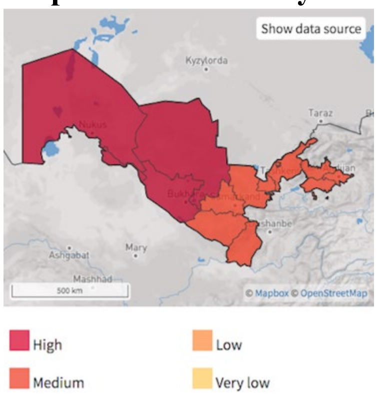
Map 2: River flood risk



Map 3: Urban flood risk



Map 4: Water scarcity risk

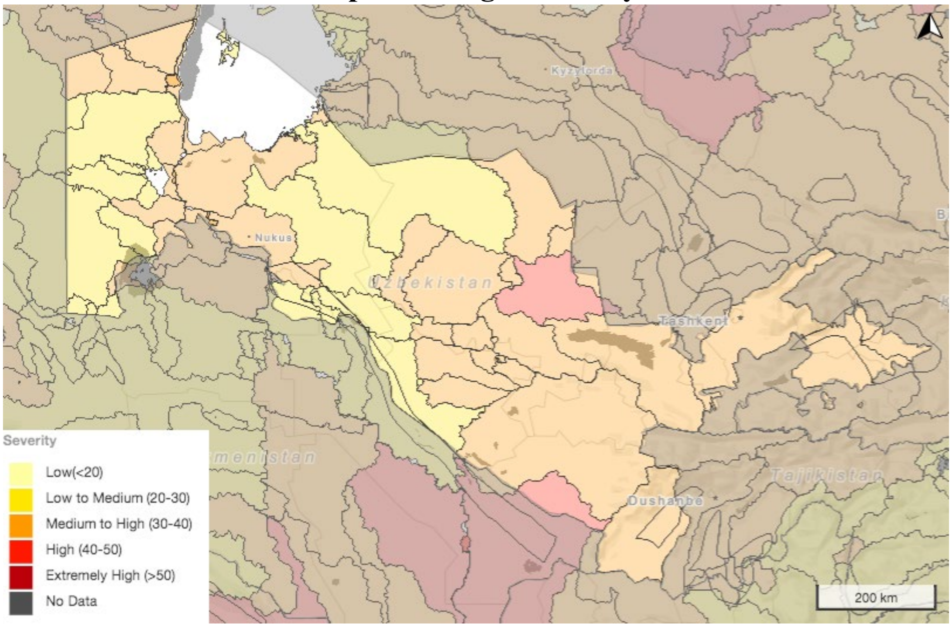


Source: Thinkhazard.org

However, the spatial data in Map 5 helps highlight the national nuances of water insecurity as well as the shared nature of the challenge, showing the higher drought severity in the south eastern region, as well as the variation within the Navoiy region. Further, Uzbekistan experiences particularly high drought severity in areas which overlap with Kazakh and Turkmen territories.

[8] The Aqueduct Global Maps Data include indicators of water quantity, water variability, water quality, public awareness of water issues, access to water, and ecosystem vulnerability. The Aqueduct Water Risk Atlas makes use of a framework of 12 global indicators grouped into three categories of risk and one overall score. The data used for the study were developed in consultation with experts, and The Aqueduct Global Maps 2.1 Data are publicly available under a Creative Commons Attribution International 4.0 License.

Map 5: Drought severity[9]



Source: UN Biodiversity Lab (https://www.unbiodiversitylab.org/index.html)

Data from satellite imagery can provide even more detailed insights. For example, the region highlighted as *least* likely to experience urban flooding in Map 3 above - the Sirdaryo region - experienced a dam breach in May 2020 which caused roughly 500 million cubic metres of water to flood through villages and cotton fields, the evacuation of more than 110,000 people and affecting more than 35,000 hectares of land in Uzbekistan and Kazakhstan.[10][11]

The use of spatial data in this case can support rapid and effective decision-making using timely and accurate data, as highlighted in Maps 6 and 7 which show images of the area before and after the flood.

Map 6: Before the flood (22nd April 2020)

Map 7: After the flood (8th May 2020)

Source: NASA Earth Observatory [1 km]

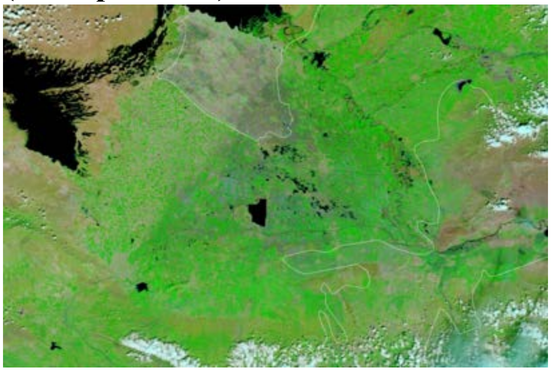
[9] Severity based on the average length and dryness of droughts (from 1901 to 2008)

[10] NASA Earth Observatory: https://earthobservatory.nasa.gov/images/146703/flooding-in-uzbekistan-and-kazakhstan

[11] Global Observatory for Water and Peace, September 2020: *Hydrodiplomacy in Rapid Action: Early Insights from the Sardoba Dam Disaster in Central Asia*

In addition, using false colours for this view further highlights the reach and trajectory of the flood, which spilled over to the Jizzakh region and neighbouring Kazakhstan.[12]

Map 8: Before the flood, false colours (30th April 2020)



Map 9: After the flood, false colours (7th May 2020)

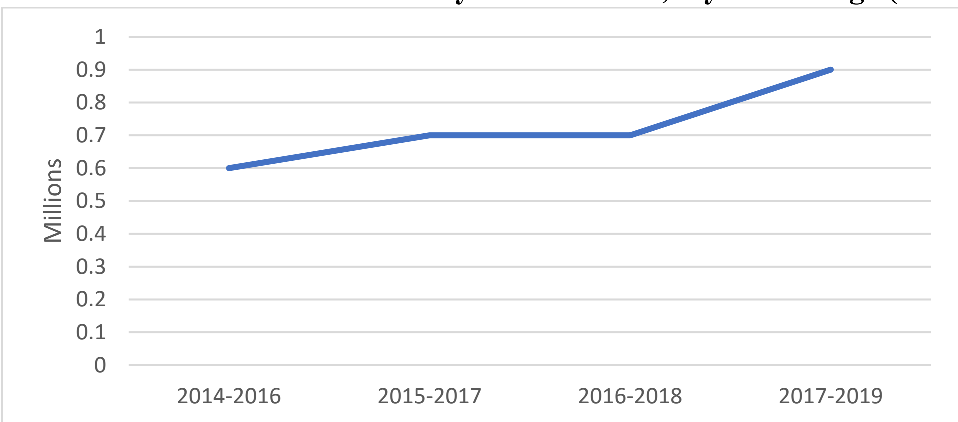
Source: NASA Earth Observatory [20 km]

This data can underpin transboundary decision-making processes, namely those relating to the implementation of the joint roadmap for transboundary water management, established on the 2nd July 2020 and highlighting the strengthening of regional water cooperation.

2. Food and nutrition security

While the number of undernourished in Uzbekistan shows a decreasing trend, the number of severely food insecure people in Uzbekistan is on the rise, from 600 thousand in 2014-2016 to 900 thousand between 2017-2019, as per Figure 2. Further, 36.2 percent of women of reproductive age have anaemia, but this figure rises to 100 percent in the Karapatan region.[13] [14] In addition, 10.7 percent of adult women have diabetes, compared to 10.5% of men. Meanwhile, 19 percent of women and 13.8 percent of men have obesity.[15]

Figure 2: Trend in number of severely food insecure, 3-year average (millions)



Source: FAO STAT (http://www.fao.org/faostat/en/#country/235)

[12] NASA Earth Observatory: https://earthobservatory.nasa.gov/images/146693/dam-failure-in-uzbekistan

[13] Uzbekistan Development Strategy Framework by 2035

[14] Global Nutrition Report country profiles: https://globalnutritionreport.org/resources/nutrition-profiles/asia/central-asia/uzbekistan/#profile

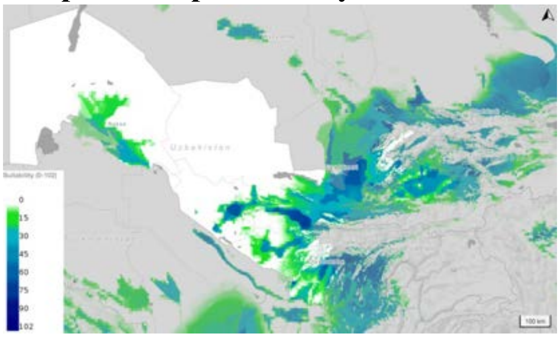
[15] Global Nutrition Report country profiles: https://globalnutritionreport.org/resources/nutrition-profiles/asia/central-asia/uzbekistan/#profile

Agriculture and food and nutrition security are inextricably linked. The decision on what to produce will affect Uzbek citizen's diet: availability and access of certain foods will partially depend on its domestic production.

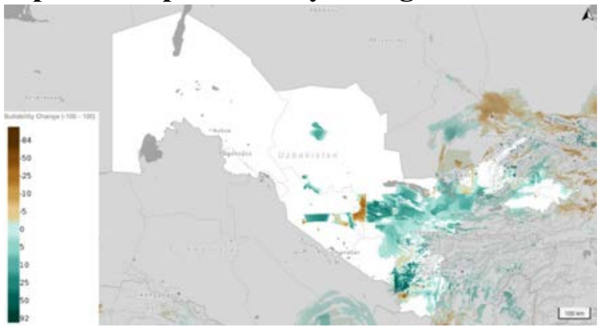
Agriculture accounts for over 19 percent of Uzbekistan's GDP, and 27.2 percent of the country's workforce is employed in the sector. Agriculture is responsible for 90 percent of the country's annual water intake. Further, 49 percent of the population live in rural areas (according to the Uzbek Development Strategy). Formal farm enterprises are private, and land is rented for 49 years from the state. [16]

The country's decision-making process for some of its agriculture-related targets (e.g., allocation of 15 thousand hectares for the growing of chili peppers in Karkalpakstan, a five-fold increase in the area for viticulture, and the extension of traditional crop production) could be enhanced by adding geo-localised targets to these commitments, based on spatial data. For example, significant parts of Uzbekistan's Nukus and southern regions see high crop suitability as per Map 10, yet the southern region's crop suitability is likely to change in the coming decades (Map 11) which could be considered in developing medium-long term sustainable strategies in Uzbekistan.

Map 10: Crop suitability 2011 – 2040[17]



Map 11: Crop suitability change 2011 - 2100[18]



Source: UN Biodiversity Lab (https://www.unbiodiversitylab.org/index.html)

Further, spatial data can support effective decision-making for the country's environmental commitments such as the promotion of agro- and bio-diversity conservation through sustainable infrastructure, and the protection of the Aral Sea and communities. For example, Map 12 below highlights the critical status of biodiversity intactness in many parts of the country. Those areas experiencing the greatest loss should be prioritised in national policies with agricultural practices that will bolster both livelihoods and biodiversity.[19]

---

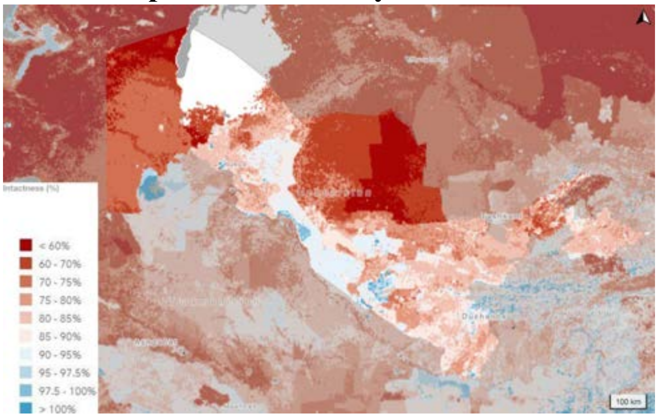
[16] ELD/CGIAR (2016): https://www.eld-initiative.org/fileadmin/pdf/Country_Policy_Brief_-_Uzbekistan_WEB.pdf

[17] This dataset show general agricultural suitability at a spatial resolution of 30 arc-second (~1km), considering rainfed conditions and irrigation on currently irrigated areas. The agricultural suitability represents for each pixel the maximum suitability value of considered 16 plants, covering 2011-2040. For further details see: Zabel F., Putzenlechner B., Mauser W. (2014): Global agricultural land resources – a high resolution suitability evaluation and its perspectives until 2100 under climate change conditions.

[18] This dataset show general agricultural suitability at a spatial resolution of 30 arc-second (~1km), considering rainfed conditions and irrigation on currently irrigated areas. The agricultural suitability represents for each pixel the maximum suitability value of considered 16 plants, covering changes in agricultural suitability over the 2011-2100 period. For further details see: Zabel F., Putzenlechner B., Mauser W. (2014): Global agricultural land resources – a high resolution suitability evaluation and its perspectives until 2100 under climate change conditions.

[19] However, this map is based on global databases and doesn't always reflect national realities, as explained in the concluding remarks

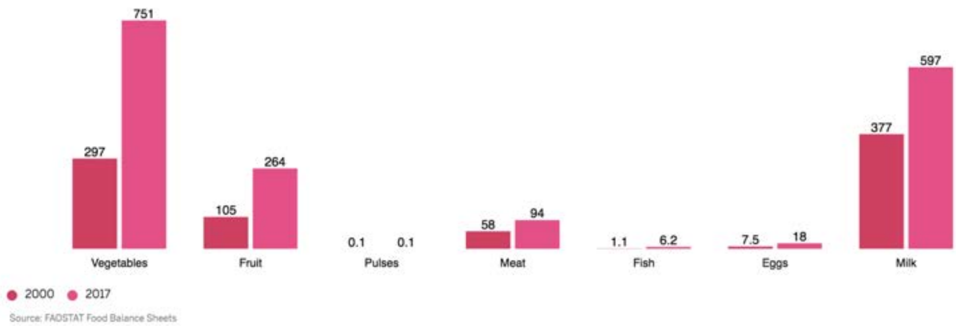
Map 12: Biodiversity intactness[20]



Source: UN Biodiversity Lab https://www.unbiodiversitylab.org/index.html)

In addition, livestock patterns and practices are an important consideration in Uzbekistan, where the consumption of meat is important both culturally and nutritionally. Although the data for Uzbekistan is limited,[21] some data exist which might serve as a proxy to show the increasing importance of meat and meat-based products such as milk in the Uzbek diet. Combined, these products saw an approximate increase of 60 percent in supply increase between 2000 and 2017, as per figure 3, below. Incidentally, spatial data would also be useful to gain insight into the geolocation and type of crops or trees involved in the 2.5-fold increase of the country's supply of vegetables over the same time period.

Figure 3: Supply of vegetables, fruit, pulses, meat, fish, eggs and milk g/person/day



Source: FAO Balance Sheets, via Global Food Systems Dashboard (https://foodsystemsdashboard.org/countrydashboard)

Spatial data can also contribute to the promotion of context-specific targets that consider the ecosystems and wellbeing of Uzbek citizens. For example, Maps 13 and 14[22] below highlight

---

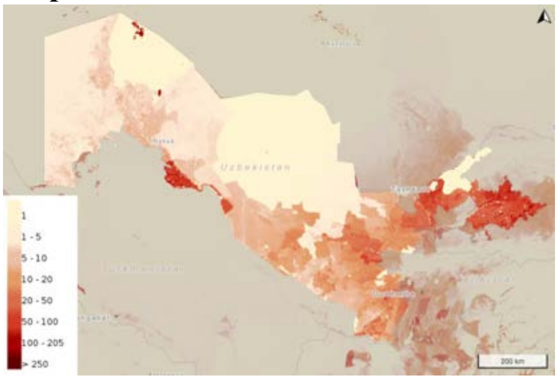
[20] The Biodiversity Intactness Index shows the modelled average abundance of originally-present species in a grid cell, as a percentage, relative to their abundance in an intact ecosystem. See: Tim Newbold; Lawrence N Hudson; Andrew P Arnell; Sara Contu et al. (2016). Dataset: Global map of the Biodiversity Intactness Index, from Newbold et al. (2016) Science. Download from UK Natural History Museum Data Portal UK Natural History Museum Data

[21] For example, there is no available data on the portion of household consumption spent on meat

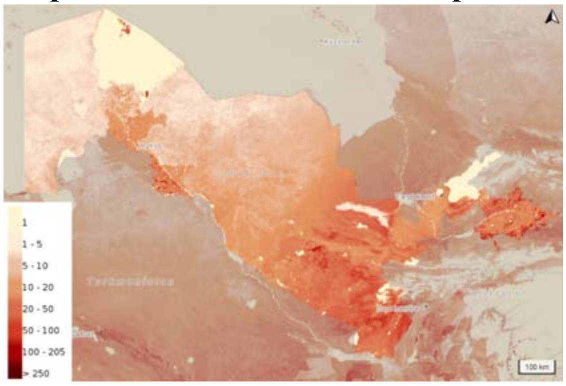
[22] The Gridded Livestock of the World (GLW) database provides modelled livestock densities of the world, adjusted to match official (FAOSTAT) national estimates for the reference year 2005, at a spatial resolution of 3 minutes of arc (about 565 km at the equator). For further details on mapping methods see: Robinson, T.P., Wint, G.R.W., Conchedda, G., Van Boeckel, T.P., Ercoli, V., Palamara, E., Cinardi, G., D'Aietti, L., Hay, S.I., Gilbert, M., 2014. Mapping the Global Distribution of Livestock. PLoS

that livestock density is lowest in regions where iron-related micronutrient deficiencies are ubiquitous, as aforementioned. Further, based on these maps, decision-making for environmental purposes in Uzbekistan could prioritise sustainable grazing and land use practices in areas where livestock is dense and biodiversity intactness is decreasing such as the Tashkent region; in contrast to the south eastern region of Karakalpakstan which despite high livestock density (particularly in cattle), sees high biodiversity intactness remaining.

Map 13: Gridded livestock: Cattle



Map 14: Gridded livestock: Sheep



Source: UN Biodiversity Lab (https://www.unbiodiversitylab.org/index.html)

Recommendations

Uzbekistan's national policies are robust in the specificity and time-bound nature of their targets, and the participatory nature of the decision-making process. This policy brief highlights benefits of complementing recent policy commitments using spatial data.

However, the brief uses data from global databases that may not reflect nuances at the national and sub-national level. These nuances could be captured by ensuring citizens play a role in gathering and monitoring data processes. Map 12 exemplifies this gap in the data: one study suggests that the Ferghana Valley has pockets of highly biodiverse areas with species that could form the basis of sustainable medicinal and textiles (e.g. dye) materials; yet these are not reflected in the data.[23] The Uzbek Development Strategy suggests an evidence-based approach to the country's development, namely through "*research [that] will make it possible to determine the optimal approach to the crops that are most efficient based on the conditions in the country*". Such research might include the identification and protection of wild crop varieties and for this, traditional knowledge (owned by local communities) will be crucial. Thus, there are several pathways forward to leveraging frontier technology to the benefit of Uzbekistan's policy making process, in particular through capacity building.

An effective and inclusive capacity building strategy could be implemented at several levels.

1. Within the Ministry for Development of Information Technologies and Communications, staff and personnel could be trained in the use and application of

ONE 9, e96084. https://doi.org/10.1371/journal.pone.0096084These digital layers are made publicly available via the Livestock Geo-Wiki (livestock.geo-wiki.org)

[23] Cambridge Central Asia Forum (2007): Documenting Local Knowledge in Central Asia

spatial data. For example, the UNDP Learning for Nature programme includes several free online courses, including a micro-module on 'using spatial data for biodiversity'.[24]

2. Uzbek citizens, from Karalkapastan to Andijan need access and capacity to use the internet. This could mean ensuring robust digital infrastructure (e.g. broadband cables and data centres) that reaches the most remote populations; implementing transparent and inclusive regulation to ensure the privacy and protection of citizens (e.g. cybersecurity policies); and policies that incorporate digital literacy and skills into education curricula, and expanding on the existing use of online platforms, for example, the creation of citizen science platforms that allow for knowledge (including traditional knowledge) to be easily shared and accessed at national and regional levels. It's important to note that initiatives relating to traditional knowledge should pay particular attention to the protection and appropriate compensation and recognition of the owners or generators of the data.
3. Domestic investment in research and development could be implemented through inter-department collaboration, as well as with the national universities. For example, the departments of agriculture and statistics could enter into joint collaboration to identify the gaps and opportunities for creating and using national spatial data for evidence-informed policy making.
4. Uzbekistan could lead the region in a cross-boundary spatial knowledge-sharing collaboration. In line with Uzbekistan's leadership - demonstrated during the aforementioned flooding in May 2020 – the country could aim to build on the momentum of this cooperation and call for a regional digital development strategy that includes crucial spatial data in particular challenges such as water usage, that requires robust collective action.

Acknowledgements

Sincere gratitude to the COMPASS project team, and to Dr Hayrullo Hamidov, Dr Bahtiyor Eshchanov, Dr Siddharth Saxena, Prajakti Kalra, Tina Schivatcheva, Jakub Csabay, and Talant Sultanov for generously taking the time to review and provide crucial insights. Many thanks also to Mr Mirshohid Aslanov for his insights into the dynamic policy making process, provided during conversations at the GCRF COMPASS Policy Forum in Brussels, 2019.

[24] Available at: https://www.learningfornature.org/en/courses/using-spatial-data-for-biodiversity/