in collaboration with

Swiss Re Institute

CONSERVING OUR COMMON HERITAGE

The role of spatial finance in natural World Heritage protection

Financial service providers have significant potential leverage to prevent the over-exploitation of natural and mixed World Heritage Sites. With the tools of spatial analysis in their risk matrices, financial service providers can gain a much clearer overview of economic activity in areas of global ecological significance.

This report is the result of a collaboration between WWF and Swiss Re Institute. It brings WWF's expertise in spatial finance and engagement with the financial sector on industrial activities in World Heritages Sites, together with Swiss Re's leading industry position in Sustainability Risk Management and commitment to the protection of World Heritage Sites.

About WWF

WWF is one of the world's largest and most respected independent conservation organisations, with over 5 million supporters and a global network active in over 100 countries. WWF's mission is to stop the degradation of the earth's natural environment and to build a future in which humans live in harmony with nature, by conserving the world's biological diversity, ensuring that the use of renewable natural resources is sustainable, and promoting the reduction of pollution and wasteful consumption.

wwf.panda.org/wwf_news

About Swiss Re and Swiss Re Institute

The Swiss Re Group is one of the world's leading providers of reinsurance, insurance and other forms of insurance-based risk transfer, working to make the world more resilient. It anticipates and manages risk – from natural catastrophes to climate change, from ageing populations to cyber crime. The aim of the Swiss Re Group is to enable society to thrive and progress, creating new opportunities and solutions for its clients. Headquartered in Zurich, Switzerland, where it was founded in 1863, the Swiss Re Group operates through a network of around 80 offices globally. It is organised into three Business Units, each with a distinct strategy and set of objectives contributing to the Group's overall mission.

Swiss Re Institute harnesses Swiss Re's risk knowledge to produce data driven research across the company and with partner organisations. We foster knowledge sharing and support decision making with our industry focused publications, client programmes and conferences.

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The editorial deadline for this study was 30 April 2020.

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United Nations Educational, Scientific and Cultural Organization · World Heritage Centre

UNESCO

The World Heritage Convention is protecting some of the most amazing places on our planet. These sites are a testimony of the cultural diversity and celebrate human ingenuity and creativity. The Convention also protects our amazing natural heritage: sites demonstrating the diversity of life in all its forms on this planet, breathtaking landscapes, outstanding geological formations and intact ecosystems that preserve the natural processes vital for life on earth.

Unfortunately, even these sites, representing less than 1% of our planet, are often threatened by unsustainable development activities, such as mining, oil and gas extraction, hydropower plants, road construction, port development, deforestation, agricultural expansion or industrial fisheries.

By ratifying the World Heritage Convention, 193 States have undertaken commitments to protect these outstanding places for current and future generations. The conservation of this common heritage is a joint responsibility. Only when we all accept this obligation, can we achieve our common goal of heritage conservation and sustainable development.

The private sector has a key role to play. The adoption in 2003 by the International Council on Mining and Metals (ICMM) of the “no-go commitment” was a major milestone. All ICMM member companies have agreed not to explore or mine inside natural World Heritage properties and to ensure that any operations outside the sites would not affect their Outstanding Universal Value or their immediate proximity. Other extractive industries have subsequently undertaken similar commitments.

Following these examples, a number of finance and re/insurance companies have similarly pledged to ensure that their credit, investment and underwriting products do not adversely affect World Heritage sites. We would like to congratulate all those re/insurance companies, which signed up to the re/insurance industry’s statement of commitment to protect World Heritage sites brokered by UNPSI and we hope that many more insurers will soon join this initiative.

However, we are also very conscious that implementing these commitments brings out new challenges of screening investments and projects against their impacts on World Heritage sites. The World Heritage Centre was therefore delighted to be involved in the development of the re/insurance industry’s first guide to protecting World Heritage Sites, launched in 2019 by UNPSI. We hope the current publication provides further useful guidance on how spatial finance approaches using geo-spatial data and satellite imagery, together with complementary analytical methods, can be used to address these challenges. We look forward to continuing working with the re/insurance sector and civil society to achieve our common goal of ***“conserving our common heritage”.***

Mechtild Rössler

Director, UNESCO World Heritage Centre

PSI

Protecting natural World Heritage Sites—which provide vital resources and resilience-building environmental services and contribute significantly to economies—is a shining example of how to tackle the global sustainability issue of biodiversity loss and ecosystem degradation. Biodiversity is our planet's life insurance policy. It is essential to human well-being and a healthy planet, and to achieving the UN Sustainable Development Goals. This is why the international community is currently working on delivering a Post-2020 Global Biodiversity Framework, and why the UN General Assembly declared 2021-2030 as the Decade on Ecosystem Restoration.

In 2018, at the 42nd Session of the World Heritage Committee, UN Environment Programme's Principles for Sustainable Insurance Initiative (PSI)—the largest collaboration between the UN and the insurance industry—in partnership with WWF and the UNESCO World Heritage Centre, launched the first global insurance industry statement of commitment to protect World Heritage Sites, outlining key actions for the insurance industry as risk managers, insurers and investors.

Building on this statement of commitment supported by leading insurers, insurance associations and key stakeholders worldwide, in 2019, the PSI worked with its member insurers, WWF, the UNESCO World Heritage Centre and ECOFACT to launch the first global insurance industry guide to protect World Heritage Sites. The main aim was to provide practical guidance to insurers on how to prevent or reduce the risk of insuring and investing in companies or projects whose activities could damage World Heritage Sites, particularly in relation to sectors such as oil and gas, mining, and large-scale hydropower. Other relevant sectors include logging, fishing, agriculture, plantations, and large-scale infrastructure such as pipelines, roads and mega-ports.

Therefore, this new report from WWF and Swiss Re Institute is timely and builds on Swiss Re's commitment as a founding PSI signatory. It illuminates the concept of spatial finance and how it can be integrated into financial risk analysis and decision-making in the context of natural World Heritage Sites. Adopting spatial finance approaches is a practical step to enhance sustainable insurance, investment and lending practices not only to protect natural World Heritage Sites, but biodiversity and ecosystems in general.

This WWF-Swiss Re Institute report complements the launch this year of the first global insurance industry guide to manage environmental, social and governance (ESG) risks in non-life insurance business developed by the PSI. The guide outlines actions that an insurer can take to integrate ESG issues into risk assessment and underwriting. It includes heat maps spanning economic sectors, insurance lines and ESG issues such as climate change, pollution, World Heritage Sites and other protected areas, threatened species, animal welfare and testing, human rights, controversial weapons, and bribery and corruption.

In this vein, we look forward to advancing spatial finance approaches and the protection of natural World Heritage Sites in the international, virtual event series this year convened by the PSI and Swiss Re Institute on sustainability leadership in insurance.

At a time of a changing climate, biodiversity loss and ecosystem degradation—and immense human tragedy and a global economic crisis due to the COVID-19 pandemic—it has become crystal clear that global sustainability challenges require solidarity and urgent and collaborative action, and that a healthy planet is fundamental to having healthy people and a sustainable future for all.

Butch Bacani
Programme Leader,
UN Environment Programme's Principles for Sustainable Insurance Initiative

INTRODUCTION

World Heritage Sites (WHS) include some of the most remarkable and most important landscapes on earth. They comprise locations such as the Grand Canyon, the Great Barrier Reef and Okavango Delta. They have been internationally recognised as being of 'Outstanding Universal Value' and protected under the United Nations Educational, Scientific and Cultural Organization's (UNESCO) World Heritage Convention.

Of the 244 natural or mixed World Heritage Sites (WHS)[1], almost half host an economic activity with potentially damaging ecological consequences. This threatens unique habitats, our natural heritage and delicate ecosystems. Unfortunately, UNESCO has limited means to ensure compliance of the States parties in implementing the Convention, which might sometimes be unwilling or unable to prioritise and protect WHS from harm.

Almost all major forms of economic activity require financial services, be it investment, credit or re/insurance. This gives financial service providers (FSP) significant potential leverage over economic activities in WHS. This leverage comes at a time when shareholders and stakeholders demand higher transparency and accountability in FSP portfolio management. With the concept of spatial finance, FSP have the ability to add a geo-spatial layer into risk management and due diligence processes, identifying activities in WHS or other ecologically sensitive areas. Subsequent analysis can reveal who is undertaking the activity and allow red flags to be built into control systems.

By working together in mutual self-interest, non-financial institutions, conservationists and FSP can help protect the integrity of WHS. Not only does it help us preserve our natural heritage, it makes sound long-term financial and business sense.

In 2015, driven by concern that commercial extractive operations were causing significant and permanent environmental damage, the World Wide Fund for Nature (WWF) conducted the first comprehensive global assessment of all natural WHS. The research showed that 31% of WHS were potentially impacted by commercial mining or oil and gas operations.[2] These findings sounded alarm bells among lenders, investors and insurers with exposure to the extractives sector. The Save our Heritage campaign by the WWF triggered a number of responses in the financial sector. To our knowledge, six banks had developed WHS no-go policies by the end of 2018, and a number of others tightened policy and management responses to WHS.[3] The International Finance Corporation, a development financier, amended its lending criteria to exclude extractive industries in WHS. This wording was adopted by the Equator Banks group, an organisation of over 100 financial institutions adhering to principles-based financial services. The UN Environment's Principles for Sustainable Insurance Initiative (PSI), co-developped by re/insurers, subsequently published together with WWF and UNESCO, WHS guidelines in 2019.[4] As a result, safe-guarding WHS has been widely incorporated into due diligence procedures within the financial sector, particularly by the re/insurance sector.

In this joint report, WWF and Swiss Re Institute are collaborating to focus on the concept of spatial finance in understanding threats to WHS. Spatial finance uses geospatial observational data – geographical information systems (GIS) – combined with machine learning to assess the risks and impact of financing and re/insurance decisions. Conclusions can be incorporated into sustainable financing and re/insurance frameworks. The spatial finance approach can be used to assess both the long-term impacts of economic activity and short-term disaster risk management, such as oil spills.

Aerial view of islands and waterways Central Okavango wilderness area in the Delta

1. WORLD HERITAGE SITES AND THEIR IMPORTANCE FOR NATURE AND HUMANITY

There are 1,121 WHS listed by UNESCO.[5] They are defined by "cultural and/or natural significance which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity".[6] "Heritage is our legacy from the past, what we live with today and what we pass on to future generations. Our cultural and natural heritage are both irreplaceable sources of life and inspiration".[7] WHS are priceless and irreplaceable assets; loss or partial damage will constitute an impoverishment of our common heritage.[8] WHS include cultural, natural and mixed sites.[9] There are 244 natural and mixed WHS under the World Heritage Convention, spread across 104 countries and covering around 3 million km^2. The most famous examples of WHS include the Galapagos Islands, the Grand Canyon, the Great Barrier Reef, and Mount Kilimanjaro.

WHS perform many ecological services, including providing food and water, stabilising soils, preserving fisheries, preventing floods and capturing carbon. They are significant reservoirs of biodiversity; some of the world's most endangered plants and animals are only found in WHS. Around 11 million people living in or around WHS are directly or indirectly dependent on the sites for income, from farming and fisheries through to tourism and its associated services.[10]

WHAT IS THE WORLD HERITAGE CONVENTION?[11]

Adopted in 1972, the World Heritage Convention aims to protect areas of global importance to humanity. The Convention has been ratified by 193 states. In order to gain WHS status, an area must demonstrate its 'Outstanding Universal Value'.

The World Heritage Committee is the main governing body of the Convention and is composed of 21 state representatives elected by the General Assembly. The Committee develops and revises operational guidelines for the maintenance of WHS. It monitors the state and condition of WHS. If the 'Outstanding Universal Value' of a site is threatened, the site can be placed on the 'List of World Heritage in Danger'.

The Committee provides specific operational guidance to states incorporating new concepts or knowledge, as required. The Committee has primary responsibility for monitoring the conservation of WHS. It can delete sites from the list and decide what is inscribed on the 'List of World Heritage in Danger'.

2. WORLD HERITAGE SITES UNDER THREAT

The International Union for the Conservation of Nature (IUCN) World Heritage Outlook[12] reports WHS facing a range of current and potential threats such as harmful economic activities from public and/or private sectors. There are currently 17 natural and mixed WHS on the List of World Heritage in Danger[13] in accordance with Article 11 (4) of the WHS convention (Convention Concerning the Protection of the World Cultural and Natural Heritage).[14] Particularly damaging can be mining and other extractive industries; power plants; dam building; infrastructure and housing development; deforestation; and intensive agriculture.

Extractive activities can cause reduced biodiversity; disturbed ecosystem processes; habitat loss and fragmentation; the introduction of invasive species; and pollution. Similarly, power plants can cause damage such as airborne pollutants; thermal releases; visual impacts; waste disposal; and land, water and noise pollution. Fossil fuel power plants can have a greater impact than renewables due to the production of airborne pollutants. Even infrastructure, such as a hydroelectric power plant, which is often seen as green, can have significant negative environmental impacts when located in or upstream from a WHS.

In many cases, large-scale power plants and dams are state backed projects. Extractive concessions are purchased from the state and production is frequently structured around a public-private quota-share basis. Any resulting large-scale mining operation, power plant or dam is subject to mandatory and voluntary national and international safeguards. Both public and private sectors can benefit in short-medium term economic gains at the expense of external costs to WHS. Ecosystem degradation can threaten long-term sustainable industries such as fisheries or tourism, which, if well managed, can support the livelihoods of local communities.[15]

However, the World Heritage Committee has little or no means to promote and ensure compliance of the protection of WHS. One of its few practical options is to review the status of a WHS and list it on the List of World Heritage in Danger. In extreme cases the WHS can be delisted. This action can draw attention, but its efficacy as a tool for change is limited. A lot of the natural WHS currently on the in- danger list have, on average, been listed for over a decade without any substantive change to the circumstances that led to their inclusion in the first place.[16]

Biodiversity loss has impacts in and beyond WHS. The Organisation of Economic Cooperation and Development (OECD), following earlier studies of The Economics of Ecosystems and Biodiversity (TEEB)[17], has categorised risk for business from biodiversity loss as ecological, liability and regulatory risks; reputational risks; and market risks.[18] Greater awareness of the impact of biodiversity loss on WHS and beyond should, in theory, lead towards business activity respectful of biodiversity.[19]

Some threats to WHS and biodiversity more widely can be mitigated through the financial sector: FSP have many leverage points over large-scale infrastructure development and extractive operations. FSP can also have a meaningful influence in more diffuse issues such as deforestation and subsequent agricultural expansion. The potential role of FSP in not only protecting WHS, but more widely influencing the health of natural ecosystems, is significant (see following pages).

Virunga National Park, Bukima, Democratic Republic of Congo
© BRENT STIRTON / REPORTAGE FOR GETTY IMAGES / WWF

WHS UNDER THREAT: VIRUNGA NATIONAL PARK

Africa's oldest national park in the Democratic Republic of Congo is one of the most biodiverse protected areas in the world. The area faces threats on numerous fronts, most notably from oil exploration in the region. In 2013, Virunga's annual economic value was estimated at USD 48.9 million with potential to increase to more than USD 1.1 billion per year. These figures are based on the direct value of tourism, fisheries and hydropower in Virunga; and the indirect value of the potential provision of ecosystem services and the non-use value of the park.[20]

WHS UNDER THREAT: SUNDARBANS

A transboundary WHS between India and Bangladesh, Sundarbans is the largest mangrove forest in the world. In 2016, UNESCO called on the Bangladesh government to abandon an adjacent coal plant investment in Rampal due to its projected environmental impacts.[21] Environmentalists and campaigners highlighted the threats to wildlife posed by the proposed coal plant, including the endangered Bengal tiger, as well as to local human populations. The case is ongoing.

Mousuni Island, Mousuni Island, Sundarbans, India
© WWF / SIMON RAWLES

3. GLOBAL GEOGRAPHIC INFORMATION SYSTEMS (GIS) ASSESSMENT OF COMMERCIAL ACTIVITY WITHIN NATURAL WORLD HERITAGE SITES

WWF conducted a global geospatial analysis of all 244 natural and mixed WHS spread across 104 countries.[22] These 244 sites occupy an area of 2,959,719km^2, less than 1% of the globe's surface. The largest five WHS[23] are responsible for nearly half of total coverage. These unique sites not only protect ecosystems and species, they provide a vast range of natural ecosystem services and wider benefits. Some of them help to protect coastlines from storm surges and flooding; support climate stability; and provide food and water for vulnerable, often indigenous communities. They offer a host of benefits to local economies, support livelihoods and safeguard culturally and spiritually important sites. These benefits can only be properly accrued if there is a healthy underlying natural ecosystem.

The analysis presented in this report was conducted in February 2019 and revisits the issue of threats to natural WHS from the 2015 analysis published in the Aviva/Investec/WWF report *Safeguarding outstanding universal value*.[24] The analysis shows that, whilst there have been some positive steps within natural WHS such as a steep decline in the area licensed to mining concessions (down 32%), the issue of industrial activity remains a concern with 72/244 WHS (29.5%) potentially impacted by commercial mining and oil and gas. In this assessment, WWF expanded the analysis to include mining facilities, dams, proposed dams, current and future oil and gas bid rounds and power plants, identifying 119/244 WHS (48.7%) with exposure. Further work is needed to determine the threat these additional existing and potential operations may pose to the natural value of natural WHS.

Despite some data limitations[25], the WWF's geospatial analysis provides the most comprehensive survey of the integrity of WHS to date. Key findings of the research included:

- 24% of WHS areal overlapped with mining concessions; 2% included active mining operations
- 16% overlapped with oil and gas concessions
- 23% had power plants located in WHS.

In total, 72 natural WHS, or 29.5% of total, have been identified with one or multiple forms of extractive activity within their boundaries (see Table 1). Overall, 119 natural WHS, or 48.8%, have been identified with one or multiple forms of potentially damaging commercial activity (extractives, power plants, and dams) within their boundaries (see Tables 1, 2 and 3).

Table 1: Number of natural WHS containing existing industrial activity by region and potential activity in the form of held but inactive concessions.

	Africa	Arab States	Asia and the Pacific	Europe and North America	Latin America and the Caribbean	Total
# of natural WHS	42	8	76*	73	45	244
# of WHS overlapped by dams, power plants, extractive concession/s and or activity (%)	25 (59.52)	5 (62.50)	39 (51.32)	28 (38.36)	22 (48.89)	119 (48.77)
# of WHS overlapped by extractive concession/s and or activity (%)	22 (52.38)	2 (25.00)	27 (35.53)	8 (10.96)	13 (28.89)	72 (29.51)
# of WHS with Mines	-	-	9	1	1	11
# of WHS with Mining Facilities	-	-	1	-	-	1
# of WHS with Mining Concessions	11	1	15	3	13	43
# of WHS with O&G Concessions	14	2	13	4	1	34
# of WHS with Current O&G Bid Rounds Concessions	-	-	-	1	-	1
# of WHS with Future Bid Rounds Concessions	-	2	1	1	1	5
# of WHS with Power Plants	2	4	21	17	13	57
# of WHS with Dams	3	-	8	6	3	20
# of WHS with Future Dams	3	-	5	1	2	11

Table 2: Number of commercial assets identified within natural WHS

	Africa	Arab States	Asia and the Pacific	Europe and North America	Latin America and the Caribbean	Total
# of natural WHS	42	8	76*	73	45	244
# of Mines identified within WHS	-	-	13	1	1	15
# of Mining Facilities identified within WHS	-	-	1	-	-	1
# of Mining Concessions identified within WHS	56	2	93	9	96	256
# of Oil and Gas Concessions identified within WHS	19	7	21	14	1	62
# of WHS with Current O&G Bid Rounds Concessions identified within WHS	-	-	-	1	-	1
# of WHS with Future Bid Rounds Concessions identified within WHS	-	2	1	1	1	5
# of Power Plants identified within WHS**	2 (1)	7 (0)	83 (56)	85 (28)	83 (13)	260 (98)
# of Dams (GOOD) identified within WHS	3	-	8	6	3	20
# of Future Dams identified within WHS	4	-	12	2	2	20

Table 3: Estimated area of extractive concessions identified within natural WHS

	Africa	Arab States	Asia and the Pacific	Europe and North America	Latin America and the Caribbean	Total
# of natural WHS	42	8	76*	73	45	244
Estimated area of natural WHS (Sq. Km)	408,106.38	97,170.13	1,158,934.62	867,152.08	428,356.23	2,959,719.45
Estimated Mining Concession Overlap with WHS (Sq.Km)	7,461.36	1,074.00	2,098.08	350.04	1,083.83	12,067.30
% Mining Concession Overlap with WHS	1.83	1.11	0.18	0.04	0.25	0.41
Estimated Oil and Gas Concession Overlap with WHS (Sq.Km)	63,429.76	3,057.68	4,926.22	3,482.78	130.07	75,026.51
% Oil and Gas Concession Overlap with WHS	15.54	3.15	0.43	0.40	0.03	2.53
Estimated Oil and Gas Current Bid Round Concession Overlap with WHS (Sq.Km)	-	-	-	296.29	-	296.29
Estimated Oil and Gas Future Bid Round Concession Overlap with WHS (Sq.Km)	-	2,581.64	85.66	21.29	20.32	2,708.91

* The natural WHS 'Uvs Nuur Basin' is a trans-regional site, located across the Europe and North America and Asia and the Pacific regions, following UNESCO's delineation the property is counted here as within the Asia and the Pacific region.

**number in brackets are the number of dams in this power plants data set from Platts, with some potential duplication with the GOOD and Futures dam data set.

Data source: see Fig. 1

Almost half of all WHS contained at least one form of commercial activity or inactive concession with potential environmental impact. This was under a framework of relatively conservative assumptions about the data and there is more work to be done on determining just how commercial activity might impact WHS ecosystems. The results are visualised in Figure 1 in the form of a map.

The GIS analysis highlights the extent of activities of extractives, power plants and dams operating within natural WHS, identifying 640 different industrial activities and their ownership. In doing so, it demonstrates the relevance of spatial finance as a financial sector methodology, enabling investors, lenders and insurers to a) rapidly identify companies operating within natural WHS; b) create data sets that can be integrated within existing systems; and c) independently visually review in near real time assets of particular concern or interest using satellite imagery.

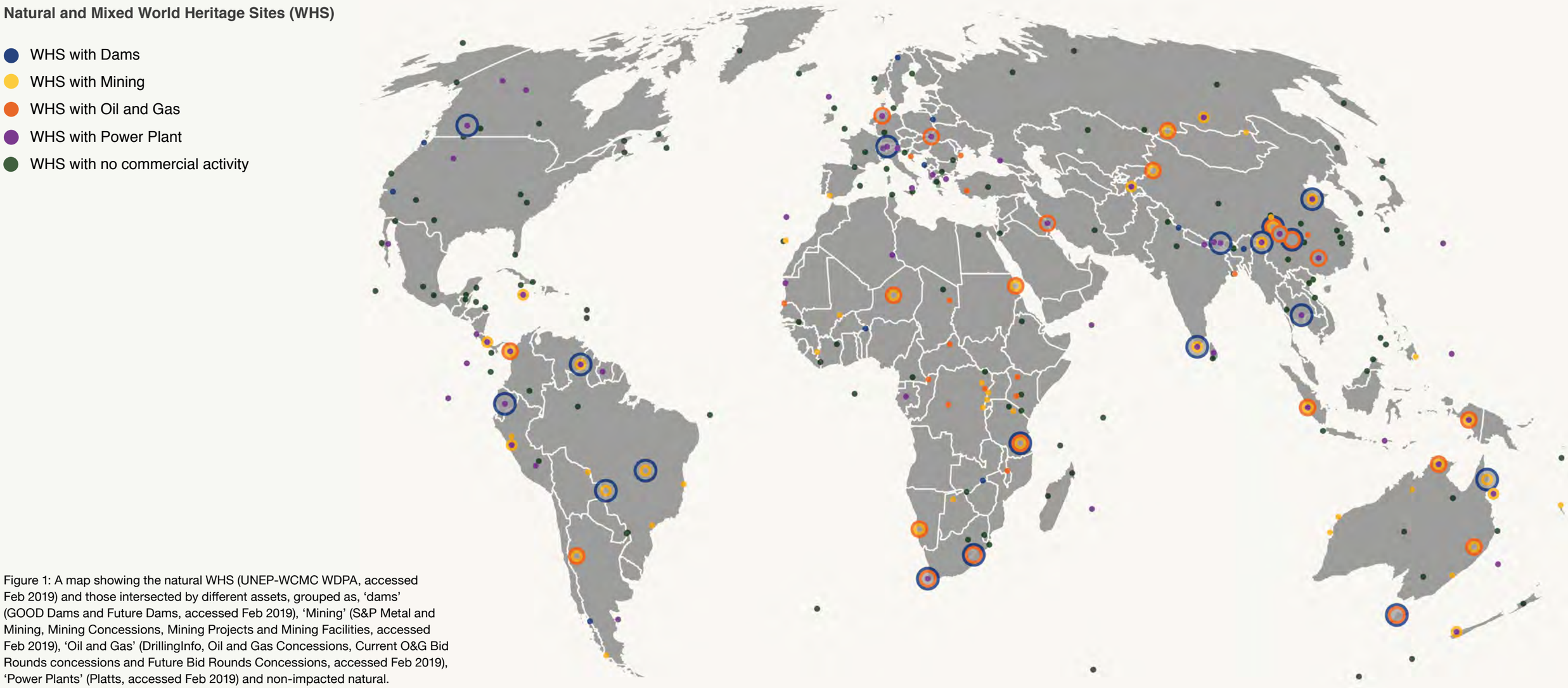


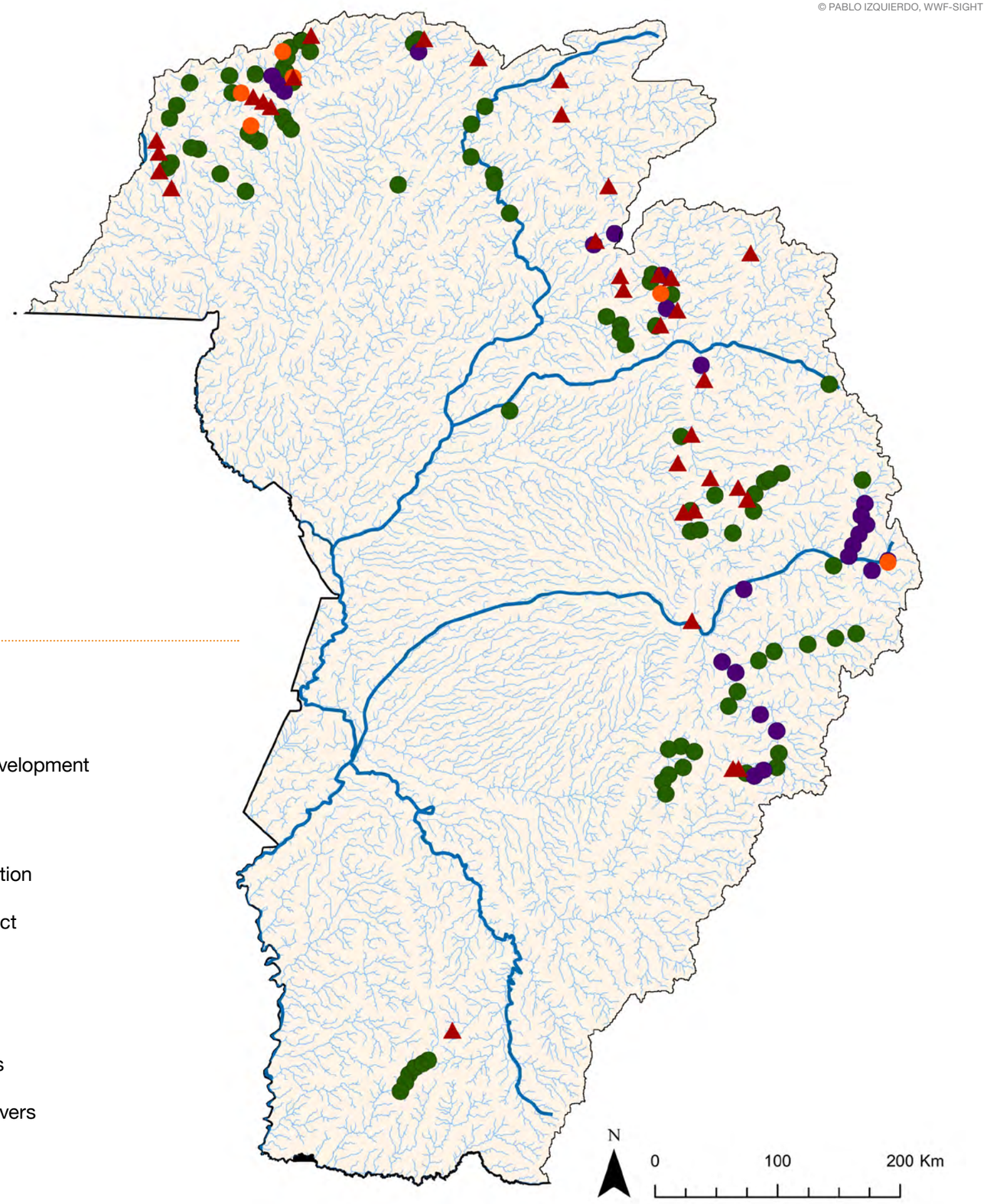
Figure 1: A map showing the natural WHS (UNEP-WCMC WDPA, accessed Feb 2019) and those intersected by different assets, grouped as, 'dams' (GOOD Dams and Future Dams, accessed Feb 2019), 'Mining' (S&P Metal and Mining, Mining Concessions, Mining Projects and Mining Facilities, accessed Feb 2019), 'Oil and Gas' (DrillingInfo, Oil and Gas Concessions, Current O&G Bid Rounds concessions and Future Bid Rounds Concessions, accessed Feb 2019), 'Power Plants' (Platts, accessed Feb 2019) and non-impacted natural.

Source: Pablo Izquierdo, WWF-SIGHT

PANTANAL: GREATEST GLOBAL TROPICAL WETLAND AND THE THREAT FROM HYDRO

The Pantanal is a vast tropical wetland situated on the borders of Bolivia, Brazil and Paraguay. Part of this wetland, located in the south-west corner of the State of Mato Grosso, Brazil, is a natural WHS that was recognised in 2020. The Pantanal as a whole is an area of great biodiversity and ecological significance, containing animal species including jaguars, tapirs, anteaters and giant otters. There are currently 52 hydropower dams in the Upper Paraguay River Basin, owned by 25 different parent companies, including multinational companies with listed shareholders. A further 101 are planned. These could have significant disruptive effects on local water flows, wildlife and ultimately the local economy. Power benefits could easily be accrued from other sustainable sources.

© PABLO IZQUIERDO, WWF-SIGHT



4. THE ROLE OF SPATIAL FINANCE

Spatial finance is a new and emerging field integrating geospatial data into financial theory and practice. GIS and remote sensing combined with machine learning have significant potential to transform the availability of independent information in our financial system to better measure and manage Environmental, Social and Governance (ESG) risk.[26]

While the reach of multilateral organisations may be limited, economic activity requires the services of the financial sector; and the leverage of FSP can be considerable. FSP offer three major product lines to business: investment services, either as direct investors or intermediaries as portfolio investors; lending and credit facilities; and re/insurance services to cover certain potential losses.

Major FSP now routinely screen their product lines to ensure compliance with internal ESG standards. With increasing frequency, such standards are demanded by institutional investors. FSP also have to respond to international guidelines and standards. Currently, these assessments differ from FSP to FSP, with internal reporting sources and documentation augmented by intelligence from teams working with risk or sustainability portfolios.

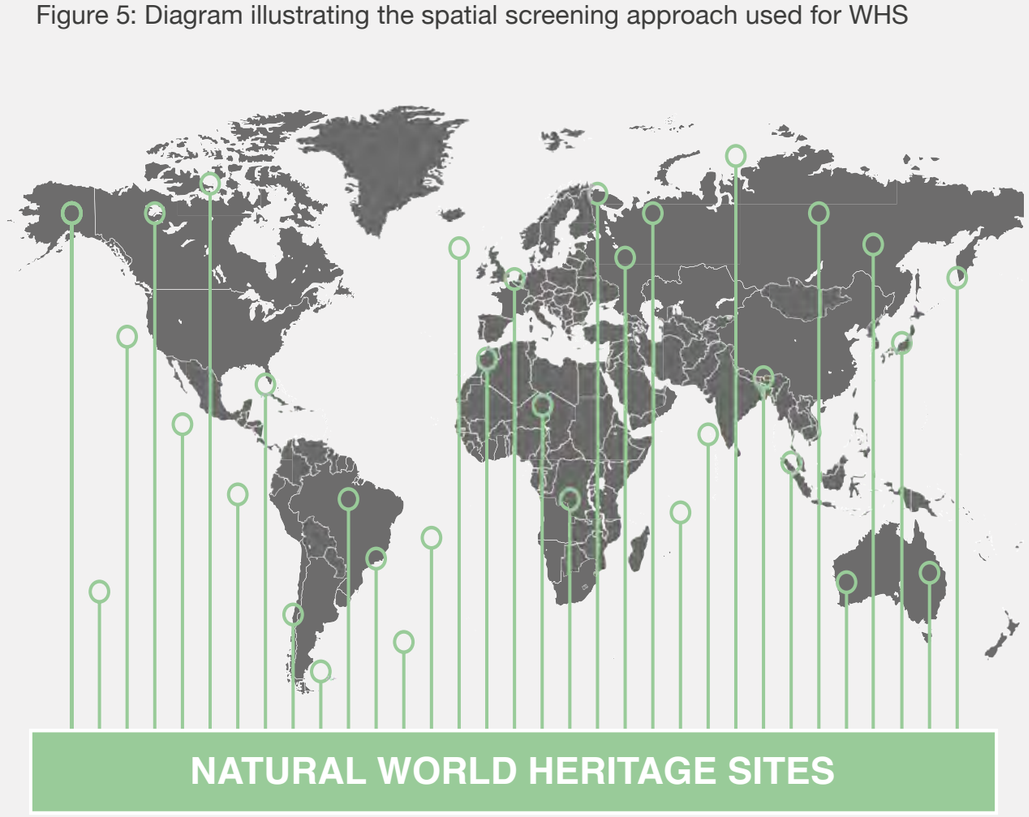
There is ample scope to augment these processes through the application of emerging spatial finance techniques. They overlay current risk and review processes with a geo-spatial layer. This geo-spatial layer can be summarised as per figure 5.

WWF AND SPATIAL FINANCE

Since 2015, the WWF has run global assessments every quarter, assessing and cross-referencing a number of industrial sectors with larger ecological burdens against WHS and other conservation areas.[27] This has produced a list of companies holding assets or operating in WHS. WWF has also demonstrated how to screen at a company level, allowing cross-comparisons of holdings by an individual company, a tool that can be particularly beneficial in cases of complex ownerships. Screening may even inform FSP about a country's management of its natural resources[28] and may even influence the state's sovereign credit risk[29], particularly in cases of small economies with high foreign income dependence on natural assets, most notably tourism.

Source: Sam Pollard, WWF-UK

Figure 5: Diagram illustrating the spatial screening approach used for WHS



1 Spatially define conservation assets

2 Intersect the conservation assets against key development data layers

3 Generate intersect results (*CSV), import into existing systems.

4 Use satellite imagery to check any assets of concern.

5. THE MAJOR STEPS IN A SPATIAL FINANCIAL ASSESSMENT

The GIS assessment is the core element of spatial finance. A GIS assessment uses multiple discrete global data sets, including a layer delineating the WHS and asset level data defining the location of commercial operations and concessions. A GIS intersect is run, generating a data table defining overlap between datasets. Data is filtered to remove insignificant overlap. The holder of the physical assets is identified and then linked to their parent companies. A flag can then be applied to the physical assets, subsidiaries and parent company, or to the parent company within a portfolio. Identifying ultimate ownership of physical assets can be a challenging undertaking.

Complementary data and analysis processes can enhance GIS assessments:

Web scraping
In December 2019, WWF, in collaboration with The Alan Turing Institute, established a web-scraping study using natural language processing to identify online news stories detailing companies operating within WHS. This provides a near real time data source into spatial assessments. For example, a global GIS intersect of the oil and gas sector will inform the overlap of a major oil and gas company's operations with key sites but will then remain fairly static, with limited changes every month. A constantly updating web scrapping feed geolocating to conservation areas or assets would help flag emerging issues such as a major oil spill.

Remote sensing
Visually assessing the overlap to identify the location of commercial assets, bordering or within WHS provides the ESG analyst with context. A fairly simple mapping platform can be used to show the location of the assets and the WHS. Adding ESA or NASA satellite imagery archives provides the analyst with open source imagery, updating approximately every five days. This provides a near real time update on the situation on the ground. High resolution data from commercial providers can also be sourced to provide greater depth of insight.

IDENTIFYING ASSET HOLDERS IN WHS

WWF's analysis has identified 62 oil and gas concessions existing in 34 WHS, including Virunga National Park. These assets had 40 different primary international holders, the majority being shared ownership with up to five different partners. One oil and gas company was estimated to hold seven concessions in six WHS; another with eight concessions in five different WHS. There are an estimated 260 power plants in 57 WHS, with a total of 148 different owners.

THE ROLE OF THIRD-PARTY PROVIDERS

WWF has developed the geo-spatial tool WWF-SIGHT which combines external data sets with its GIS capacity. These include commercial data sets from S&P Global – SNL for mining, DrillingInfo for oil and gas and S&P Platts for the power sector – together with the World Database on Protected Areas (WDPA) for WHS. Due to licensing restrictions, WWF can only distribute analysis results and not share, for example, company lists.

There is an emerging ecosystem of spatial platforms, building on advancements in satellite imagery and analysis capacity, to provide insights into environmental issues, such as climate change, deforestation, and water risk at regional, national and increasingly also at a parent company level. As technology continues to improve, these approaches will develop further and become more widely available within the risk management tools used by the financial sector. Some powerful platforms integrating information on high-risk sectors and protected areas are already available commercially[30].

6. USE AND APPLICATION OF GEO-SPATIAL DATA IN THE FINANCIAL SECTOR: AN EXAMPLE FROM RE/INSURANCE

Many factors define the space we inhabit. One of those is finance, notably insurance. Insurance has three functions with spatial impact.

1. Firstly, re/insurers must carry out risk identification and risk assessment of an insured person, property or activity. This assessment is conducted through modelling, scenario analysis and risk planning. Using the estimation of the expected loss and frequency of a (potentially) hazardous event, insurers can price the risk; and set the terms and conditions of the re/insurance policy.

2. Secondly, by selling coverage of specified risks, insurers provide financial security for their clients; and ease the undertaking of an economic activity.

3. Thirdly, and as a result of the first two functions, the insurer sets the premium and defines terms and conditions. These provide incentives for behavioural change that promote risk mitigation and prevention.

WHS are frequently subject to competing socio-economic interests. The United Nations Environment Programme Finance Initiative (UNEP FI) Principles for Sustainable Insurance (PSI) and WWF[31] have identified both severe and high-risk activities within WHS as including: oil and gas extraction, mining; large-scale hydropower; commercial logging; fishing; intensive agriculture; and infrastructure investment, such as pipelines, roads and ports. A lot of these activities would not take place without FSP participation across the lifetime of the activity.

Global re/insurance coverage has become increasingly sensitive to potentially damaging socio-economic activities, either inside a WHS or any natural ecosystem of biodiversity or cultural value. To this end, insurers and multi-national organisations co-signed the first-ever re/insurance industry commitment to protect the integrity of WHS within the framework of risk management, re/insurance and investment activities.[32] This contributed to the development of PSI/WWF/UNESCO insurance industry guidelines that were published in October 2019.[33] The WHS re/insurance industry pledge articulates commitments to take action in the following areas: :

- Accessing data and understanding best practice
- Raising awareness and supporting widespread action
- Developing and implementing a common WHS risk approach
- Protecting WHS proactively
- Engaging clients and investor companies

The re/insurance industry pledge follows the 2003 commitment of the International Council on Mining and Minerals (ICMM) not to explore or mine within WHS. Similar commitments are in the pipeline for the oil, gas and hydropower sectors.[34]

This highlights the third function of re/insurance. Not offering re/insurance on the grounds that activity impinges a WHS sends a powerful signal to the wider financial market. Not offering re/insurance may deter lenders and will cause investors' concern. Re/insurers will be making a clear commercial call on the sustainability and integrity of the economic activity. This demands a responsible decision-making process, taken by re/insurers through their environmental risk framework. In their role as intermediaries, re/insurance brokers can foster transparency on the impact of an economic activity and the protection of WHS. By doing so, they can add value to their clients' risk management.

As an example, Swiss Re has extensive risk assessment and underwriting measures in place to regulate business in sites of specific cultural or environmental value, including WHS. They complement global measures to promote sustainable business practices.[35]

SWISS RE'S SUSTAINABLE BUSINESS RISK FRAMEWORK

Swiss Re's Sustainable Business Risk Framework (SBRF) was first developed in 2009. It allows for the assessment of risks related to the social and environmental consequences of re/insurance and investment transactions. It consists of a set of policies and a due diligence process comprising an online assessment tool and a referral tool to assess sensitive business transactions.

The commitment to preserve protected areas is enshrined in the umbrella guidelines on environmental protection; and in sector-specific policies, including mining; oil- and gas; hydro; forestry; pulp and paper; and palm oil. Swiss Re does not provide business support to entities or projects that contribute to the conversion or degradation of ecologically sensitive areas. Swiss Re also respects specifically protected areas including WHS.

Through an internally developed watch-list, the SBRF assessment tool informs underwriters which companies or projects need further due diligence. Underwriters are required to enter the coordinates of a given project into Swiss Re's CatNet® tool, which indicates potential overlaps with WHS and other protected areas. If there is an overlap with a WHS, the underwriter will communicate the reason for turning down the business to the client. For companywide covers, Swiss Re relies on data providers that flag companies for their involvement in protected areas. Data platforms available do not, however, currently allow for a systematic, near real-time and independent screening using physical asset-level data and spatial financial services approaches, as described in this report. For complex cases that need further analysis of specific environmental (e.g. substantial water pollution) or social issues (e.g. the right to free, prior and informed consent of indigenous peoples), Swiss Re underwriters submit queries through the SBRF referral tool. These referrals are then analysed by an in-house expert sustainability team. The recommendation of whether a transaction is compliant or non-compliant with the SBRF is a binding decision. There can only be three outcomes of a referral: proceed; proceed with conditions, for example the client needs to submit an Environmental Impact Assessment of the project; or abstain from the business transaction.

Swiss Re is committed to continue to work with clients, industry peers, investors, data providers and civil society groups as well as with NGOs in order to strengthen the protection of the earth's most remarkable landscapes such as WHS.

CONCLUSION AND RECOMMENDATIONS

Spatial finance is still in its infancy. Complementary layers of analysis, such as web-scraping and remote sensing require further development and refinement. However, the sector is rapidly evolving.

We recommend that commercial financial data providers:

- Rapidly adopt spatial finance technology and techniques to improve the understanding of the impact of economic activity in and around WHS and other sensitive areas;
- acquire asset-level data for key sectors combined with key environmental, social and biodiversity spatial data and satellite imagery to be able to match ownership to the lending, investment and re/insurance portfolios of FSP.

Rapid improvements in remote sensing and satellite imagery will support these developments. Complementary machine learning technologies and layers of analysis will also evolve. WWF, together with The Alan Turing Institute, for example, are planning to provide Geo RSS and JSON feeds of listed threats in conservation sites and the owners behind them by mid-2021. This will effectively provide a public list of geolocated threats and corporate activity in and around key conservation sites.

Increasingly, FSP will work these layers of data analyses into their risk management practices. Improved geolocation services will not only increase convenience, it will remove dependency on company disclosures.

The following are recommendations for the future provision of spatial finance analytics. In the first instance FSP should follow PSI/UNESCO/WWF guidelines to protect World Heritage[36], which include in particular:

1. Introduction of no-go policies and/or more stringent due diligence policies for WHS and other protected areas into sustainability policies; and ensuring efficient implementation across the company.
2. Develop or obtain from intelligence providers, from the UNESCO World Heritage Centre and/or civil society organisations - where possible - a watchlist of companies and projects that have potential or actual negative impacts on WHS.
3. Prospective business opportunities should be screened against such a watchlist. This step should be embedded in underwriting and investment processes, and ideally automated.
4. The system should raise a flag when a company or project matches an entry in the watchlist.

Additionally, and as highlighted in this report it is recommended to:

5. Adopt a spatial approach within existing risk management and investment frameworks for WHS and other environmentally sensitive areas. FSP should consider project (or corporate level) risk screening specifically but not limited to WHS; e,g., financial institutions should ask their business intelligence provider for spatially explicit information on ESG risks. Some platforms are already commercially available[37].
6. FSP should report their spatial activities, dependencies and impacts in a standardized way that would allow comparability within the sector. Further, FSP should develop technical data standards that would smooth B2B data interactions ensuring terminology and data consistency between systems and teams. Best practice guidelines would remove some of the initial unknowns and provide a benchmark to compare against and aid the adoption of novel methods. Once established, FSP should make it a requirement for companies to disclose the location and delineation of their physical asset data in a standard format. Without standards, companies may be required to provide data in multiple different formats.
7. When extractive companies are identified as operating within or adjacent to natural WHS we recommend - as outlined in the 2015 report ‘Safeguarding outstanding natural value[38] - that FSP, where possible and appropriate, engage with the issue by:
    - Directly engaging extractive companies in their portfolio that are active in, or adjacent to, natural WHS to encourage them to change their strategy, or to divest if impact on WHS remains severe and systematic.
    - Engage with the extractive sector to encourage improved disclosure and the wider adoption of ‘no go’ and ‘no impact’ commitments for WHS.
    - Collaborate with other FSP to address the issue collectively

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ENDNOTES

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30. Third Party data providers (this list may not be exhaustive):

    Integrated Biodiversity Assessment Tool (IBAT): IBAT provides authoritative geographic information about global biodiversity. The users can access the World Database on Protected Areas, IUCN Red List of Threatened Species, and the World Database of Key Biodiversity Areas through the tool's data download services.

    Ecometrica: A more 'holistic' platform, which provides insights based on a diverse range of satellite-derived products. From forest protection to disaster response, sustainability reporting software to full global supply chain intelligence, Ecometrica's technology uses machine learning to provide users with a complete view at local, national, regional or supranational scales.

    RepRisk ESG Risk Platform: identifies and assesses ESG and sustainability risks associated with over 30,000 projects and 120,000 companies in more than 180 countries. It allows to compile a global watchlist of sensitive projects and companies and link asset- and corporate-level adverse impacts to World Heritage sites and other protected areas. The data and metrics are updated daily and can be fed into the underwriting, risk, compliance and investment systems of insurances and banks.

    Verisk Maplecroft: Corporate Exposure Tool - Measures asset-level oil & gas company and peer group industry exposure to ESG, climate and political risks, allowing users to compare and benchmark the exposure of almost 3,000 companies and 10,000+ assets to over 150+ issues.
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COVER IMAGE: Aerial view of Hardy Reef, Great Barrier Reef, Australia. © JÜRGEN FREUND

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To stop the degradation of the planet's natural environment and to build a future in which humans live in harmony and nature.