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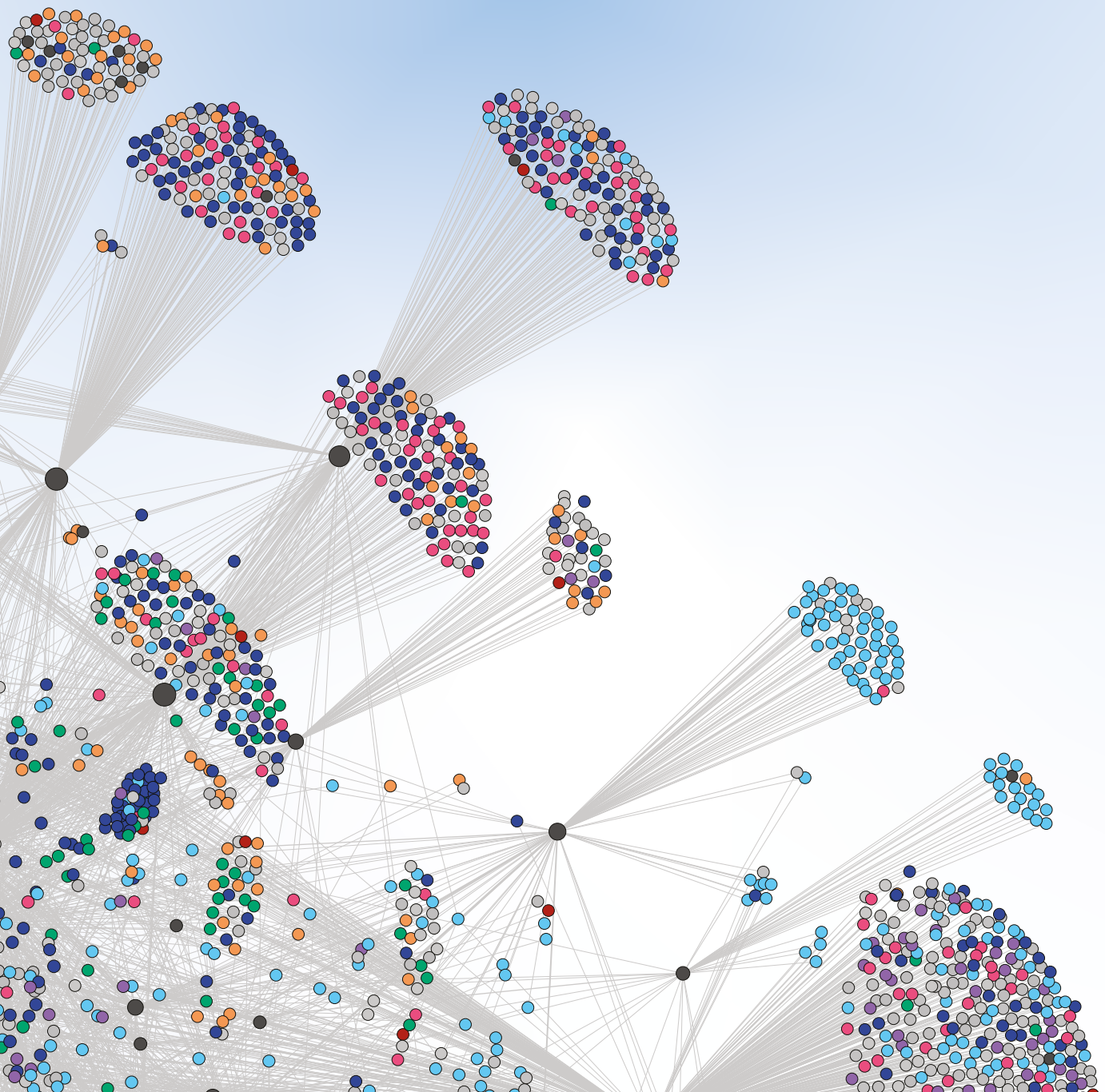
FINANCIAL CENTRES FOR SUSTAINABILITY

Inquiry: Design of a Sustainable Financial System

NUDGING the FINANCIAL SYSTEM

A NETWORK ANALYSIS APPROACH



The UNEP Inquiry

The Inquiry into the Design of a Sustainable Financial System has been initiated by the United Nations Environment Programme (UNEP) to advance policy options to improve the financial system's effectiveness in mobilizing capital towards a green and inclusive economy—in other words, sustainable development. Established in January 2014, it published the first edition of 'The Financial System We Need' in October 2015, with the second edition launched in October 2016 and its final report launched in 2018.The Inquiry has worked in 20 countries and produced a wide array of briefings and reports on sustainable finance.

More information on UNEP Inquiry is at: *www.unepinquiry.org* or from: Ms. Mahenau Agha, Director *mahenau.agha@un.org.*

UNDP Finance Sector Hub

UNDP's Finance Sector Hub (FSH) is a finance and innovation platform that draws on a critical mass of UNDP expertise, initiatives, and partnerships to support the mobilization and leveraging of resources for the SDGs and lead the implementation of the new UNDP private sector strategy and other initiatives which fully supports the implementation of the Strategic Plan and supports governments to align private sector activities and financial investments with the 2030 Agenda. The Hub is an integral part of both the Bureau for Policy and Programme Support (BPPS) and the Bureau of External Relations and Advocacy (BERA), as part of the Global Policy Network.

More information on the UNDP FSH is at: *www.undpfsh.org* or from: Mr. Marcos Neto, Director *marcos.neto@undp.org.*

International Network of Financial Centres for Sustainability

The International Network of Financial Centres for Sustainability (FC4S Network) is a partnership between the world's financial centres, comprised of 30 member centres as of March 2020. The United Nations Environment Programme serves as its Secretariat. The objective of the Network is to enable financial centres to exchange experience, drive convergence, and take action on shared priorities to accelerate the expansion of green and sustainable finance. The FC4S Secretariat works with financial centre members to achieve this objective, through the provision of research on emerging issues, guidance on best practices, strategic advisory, and project development and support services, including through regional initiatives.

More information on FC4S is at: *www.fc4s.org* or from: Mr. Stephen Nolan, Managing Director *stephen.nolan@un.org.*

About this report

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A network analysis approach

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Foreword

Not for decades has the financial system had to deal with a crisis of the magnitude of the COVID-19 pandemic. In a few short weeks, the financial system as we have known it has been turned on its head and has now to deal with issues – present and future – that are quite literally life-or-death challenges.

Priority must now be given to addressing the immediate health issues, as well as the impact on the poor and vulnerable of the shutting down of our economies. But as we do this, we should also consider how best we can rebuild when the crisis fades and normal economic activity once more becomes possible. Both the disruption we are living today, and the necessary delays in initiating large-scale economic recovery programmes, must not be seen simply as a disaster – but as an opportunity to rethink the structure of the economy, and to plan for how the economy can be aligned with a resilient, low-carbon future.

In this context, the importance of partnerships and networks to overcoming a global challenge is magnified, ensuring that ***Nudging the System***, could not come at a more important time for the sustainable finance agenda. Highlighting the recent spectacular growth in initiatives, tools and outputs driven by a complexity of public-private sector actors and partnerships all committed to a scaling up of sustainable finance into the wider financial system, it underpins how important this agenda is to meeting the 2030 Agenda for Sustainable Development and the 17 Sustainable Development Goals. And while demonstrating this, it also highlights that to date there has been no systemic analysis that maps out the complex array of relationships of sustainable finance partnerships; a map that identifies exactly how these networks function and the interplay, if any, between the different initiatives.

Building on extensive data analyses, this paper successfully achieves this goal. It ensures that we as the reader gain an improved understanding of the sustainable finance ecosystem and its partnerships, while providing important insights into current systemic engagement and coordination efforts currently under way. It provides an analysis to allow those involved in this space to strive for greater collaboration and coordination, in particular at the multilateral level, the G7 and G20 platforms, all of which have a key leadership role to play in successfully scaling up the sustainable finance agenda into the wider financial system.

This is what the Financial Centres for Sustainability (FC4S) global network strives to achieve by enabling financial centres to exchange experiences, drive convergence, and take action on shared priorities to accelerate the expansion of green and sustainable finance. With the United Nations Environment Programme serving as its Secretariat, the network works with members to achieve this objective, through the provision of research on emerging issues, guidance on best practices, strategic advisory, and project development and support services, across its global network of 30 members; all geared towards supporting their efforts to fully align with the Paris Agreement and the achievement of the Sustainable Development Goals.

Stephen Nolan
Managing Director,
International Network of Financial Centres for Sustainability

Executive Summary

Sustainable finance is no longer a niche phenomenon. The sustainable finance ecosystem has seen a dramatic growth in scale, scope and complexity of actors, initiatives, tools and outputs. There has however been no systemic analysis that maps out the complex array of relationships of sustainable finance partnerships (networks, pledges, coalitions, platforms, principles, etc.) to determine exactly how networks function.

Building on extensive data, the analysis throughout this paper is a first attempt to improve the understanding of the sustainable finance ecosystem, its partnerships, actors and emerging network characteristics related to the implementation of the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs).

Network analyses of these diverse array of sustainable finance partnerships is deemed relevant for the alignment and cascading of sustainable finance into the wider financial system. The main argument is that a systems approach to 'greening of the financial system' based on network analysis can improve understanding, and provide new insights into systemic engagement and coordination efforts. It focuses on efforts currently being undertaken by individual countries, regional groups, Multilateral Development Banks (MDBs), International organizations (IOs), private sector entities, and Non-Governmental Organizations (NGOs) thereby strengthening the multilateral sustainable finance cooperation agenda.

The current sustainable finance network is composed of 115 different "partnerships", 5,181 constituent members and more than 10,000 connections. Based on network analytics, this paper shows that 74.6% of the network is connected to only one partnership and only 13.3% of the network constituents are connected to three or more other partnerships. This means that a small number of constituents have a high number of connections to the different partnerships and a high number of constituents have a low number of connections.

The analysis also shows that the network is rather small, as the length of the path from any two different network participants is 3.67 on average, any constituent in the network is at less than four degrees of separation from anyone else. This just highlights the role that International Organizations with a broad geographic presence such as UNDP or MDB's can play to convene and connect, facilitate and scale up the reach and impact of the current sustainable finance network.

Based on the adoption of "partnerships" by the biggest banks, asset managers and asset owners, the paper argues, that it might be the start of a sustainability divide where a few groups of emerging sustainability leaders are frequently seen as the early adopters and hence repeatedly targeted by initiatives pioneered by International Organizations thereby leaving on the side a large majority of the network. It also shows that, on average, both banks and asset managers are involved in more partnerships, making them more central to the network than insurance providers and asset owners.

When analysing network constituents with financial regulatory capacities (central banks, ministers of finance, securities regulators, etc) the paper shows that about half of the 'regulators' with three or more "partnership" connections are in developing countries, indicating the sustainable finance agenda is not one being promoted solely by developed countries. This is important, as developing countries are more exposed to the impacts of climate change and will require significantly more financing to achieve the objectives set forth by the 2030 Agenda.

The analysis also reveals that there is an average overlap of 40% between the different regulatory networks (Figure 8) which presents a great opportunity to increase coordination and collaboration among these type networks as drivers of change, leveraging on each other's core competencies.

At no other point in time has the world faced such an economic and financial challenge. Recent events have just emphasized the interdependence of our economic and financial systems with nature and that the decade ahead -ten years from 2030- needs to be a decade of acceleration, one that drives transformative action and where the multilateral system converges presenting a united front. This is no different for the sustainable finance agenda and the financial regulators and market players driving the agenda in this space.

While the work initiated by the different partnerships mapped out in this report has certainly contributed to an acceleration in the number of green finance actions and policy and regulatory measures being issued,[1] rethinking and transforming our financial system to safeguard our commons and realize opportunities for all will require to pursue a collective action agenda within the sustainable finance ecosystem.

This collective action agenda will need to be driven by an appropiate understanding of the underlying network characteristics. In order to further develop appropiate network analytics this paper proposes longer-term research objectives such as:

- Continued identification, mapping and characterization of existing networks according to their impact objectives;
- Examination and documentation of the kind of networks that deliver the most effective results or impact;
- Exploration of how soft norms (principles) and explicit norms (rules) can help design, shape networks and promote market adoption; and
- Identification of modalities and mechanisms that might enable and maximize network coordination and linkages.

These and other network analytics can provide a strategic resource, delivering useful insights to align the sustainable finance organizational strategies, enhancing coordination and complementarity of both donor and recipient of funds thereby encouraging wider ecosystem efforts through which to develop particular network interventions to 'nudge the financial system'.

Context and rationale

Since its early days, the sustainable finance ecosystem, which includes the sustainable finance agenda and its 'landscape' for action, has evolved in scale, scope and complexity.[2] A dizzying array of sustainable finance initiatives, networks, platforms, coalitions, commitments and pledges have been established, continue to be proposed, and with a greater number of committed financial institutions have completely transformed the sustainable finance ecosystem at all levels – global, regional and national.

The current reality is that the global financial system is becoming increasingly complex with the emergence of new technologies such as cryptocurrencies, blockchain and artificial intelligence (AI), which are disrupting traditional ways of doing finance. These technologies expand national and cross-border interconnections[3] and interdependencies, yet also demonstrate new areas of vulnerabilities.[4] These growing complexities are also clearly impacting on the financing and implementation modalities for the United Nations (UN) 2030 Agenda and its Sustainable Development Goals (SDGs).

The "*quiet revolution*" in sustainable finance signalled for the first time by the UNEP Inquiry's landmark report in 2015 ***The Financial System We need*** is now no longer quiet nor a niche movement but characterized by a dramatic proliferation of sustainable finance-related tools, initiatives and actors. However, the efficacy of these networks has not been adequately analysed.

Established to explore how key areas of finance – policy, regulation and market practice – could be aligned with sustainable development, the UNEP Inquiry has consistently promoted novel, innovative approaches to start a research and engagement process across the world's major economies and at the global level. Since its 2014 launch, the Inquiry's research[5] has been informed by the following three core questions:

- Under what circumstances should measures be taken to ensure that the financial system takes fuller account of sustainable development?
- What measures have been and might be more widely deployed to better align the financial system with sustainable development?
- How can such measures best be deployed?

In order to continue advancing new research, the Inquiry believes that it is time to ask whether the exponential growth in sustainable finance modalities and outputs (such as platforms, initiatives, coalitions, networks, pledges, principles), which for the purpose of this paper are defined broadly as "partnerships", can be better understood, and more effectively scaled up via a network analysis approach through which to develop particular network interventions to 'nudge the financial system'.

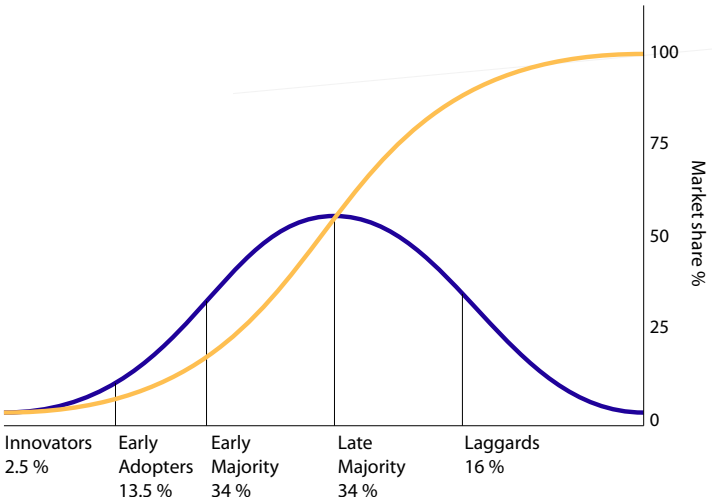
Much work has been done to understand the influence of the structural characteristics of the financial network on its stability, using both numerical and visual methods of network analysis. These analyses have led to better understanding of the feedback and cascade phenomena that can reduce system heterogeneity and lead to greater levels of instability in the financial system.[6] Market actors, financial regulators, MDBs and IOs reference the need for systemic changes to reboot the financial system in order to promote unlocking and alignment of financial flows to sustainable development. But to date no systemic analysis has mapped out the complex and diverse global sustainable finance space of "partnerships" and asked whether networks matter and how exactly can they be leveraged for this purpose.

1 Sustainable finance: from niche to mainstream

Sustainable finance is no longer a niche phenomenon. Understood as an investment approach that considers environmental, social and governance (ESG) factors in portfolio selection and management,[7] it already accounts for more than 25% of professionally managed assets.[8] But only a small number of investors hold these assets, in a market where the 165 world's leading asset managers hold more than 65% of the total assets under management (AUM). If mass market adoption (measured as the number of asset managers) is being hindered by the perceived risks of sustainable finance,[9],[10],[11] then a larger number of people will have to be exposed to and adopt sustainable finance before it spreads in a chain reaction. This same rationale can be applied to other sectors (e.g. banking, insurance, etc.) within the finance industry.

According to the law of diffusion of innovation (Figure 1), sustainable finance is at a chasm,[12] that is to say the stage when a product, service or technology transitions from the early adopters to a larger market segment, sometimes called the early majority. Sustainable finance is now at its tipping point, which only underscores the importance of a system-wide network analysis approach. There is increasing interest, driven by underlying risks[13] or demographic shifts,[14] to align investments to combat climate change, and other aspects in the sustainable development agenda, but the question is what is preventing or catalysing widespread adoption of sustainable financing?[15]

FIGURE 1. LAW OF DIFFUSION OF INNOVATION



Source: Rogers, E.M.[16]

The overall objective of this paper is to improve the understanding of the evolving sustainable finance ecosystem by taking a systemic view and adopting a network analysis approach that can:

- Provide a better understanding of the structural transformations and systemic changes required;
- Identify cascading pathways of sustainable finance practices into the wider financial system; and
- Allow for a greater alignment for the financial system to be able to deliver on the objectives set forth by the 2030 Agenda for Sustainable Development.

The immediate aim is to examine the vast range of sustainable finance "partnerships" (as defined earlier) that constitute key elements of the sustainable finance ecosystem. An initial mapping of the sustainable finance ecosystem is the result of an extensive research and collaborative process conducted under the aegis of the UNEP Inquiry and its partners. It features an analysis of publicly available data collected through online research and regional network expert interviews. As a network analysis tool, it serves to understand the interrelations and interconnections in the sustainable finance ecosystem that can allow for an effective scaling up of sustainable financing partnerships.

2 The sustainable finance ecosystem: analysing the momentum

In order to frame the paper's methodological approach and findings, Box 1 provides a brief overview of key relevant global outcomes related to the post-2015 sustainable finance space and the 2030 Agenda for Sustainable Development.

BOX 1. PROGRESS TOWARDS A SUSTAINABLE FINANCIAL SYSTEM

2015 was a landmark year for multilateralism, international policymaking, and sustainability. The international community welcomed the positive outcomes of the Addis Ababa Conference on Financing for Development (FFD) in July, which emphasized "promoting alternative and effective financial instruments to enhance climate finance and stimulate climate-friendly private investments." The 2030 Agenda for Sustainable Development, with its 17 SDGs, was adopted at the UN Sustainable Development Summit in New York in September. In December, 195 nations adopted the Paris Agreement to combat climate change and trigger actions and investments towards a low-carbon, resilient and sustainable future.

The role of the private sector and the broad financial system in sustainability had remained under the radar, even more so in the immediate aftermath of the 2008 financial crisis. But with the adoption of the 2030 Agenda and Paris Agreement, the governance of the financial system and the relationships within the architecture of the system are increasingly relevant as areas for policy research. More significantly, delivering on the promise of sustainable finance partnerships has been deemed essential to achieving the SDGs as UNCTAD estimates financing needs of US$2.5 trillion annually for developing countries.

International financial cooperation:

- From 2016 to 2018, the G20 Green Finance Study Group[17] was tasked to identify institutional and market barriers to green finance, and based on country experiences, develop options on how to enhance the ability of the financial system to mobilize private capital for green investment.[18]

- At the Paris One Planet Summit of 2017, the Network of Central Banks and Supervisors for Greening the Financial System (NGFS) was established with the purpose to help strengthening the global response required to meet the goals of the Paris Agreement and to enhance the role of the financial system to manage risks and to mobilize capital for green and low-carbon investments.[19]

- Building on the Addis Ababa Action Agenda (AAAA), the UN Secretary-General released a four-year Strategy for financing the 2030 Agenda for Sustainable Development in September 2018.

- In September 2018, the UNDP Finance Sector Hub launched SDG Impact, an initiative to advance a unified, global effort to authenticate SDG-enabling investment.

- In April 2019, governments from more than 20 countries launched the Coalition of Finance Ministers for Climate Action, which recognized the challenges posed by climate change and the unique capacity of the world's finance ministers to address them.[20]

- In September 2019, UNEP FI launched the Principles for Responsible Banking and the Net Zero Asset Owner Alliance.[21] The Principles provide the framework for a sustainable banking system, and help the industry to demonstrate how it makes a positive contribution to society.[22]

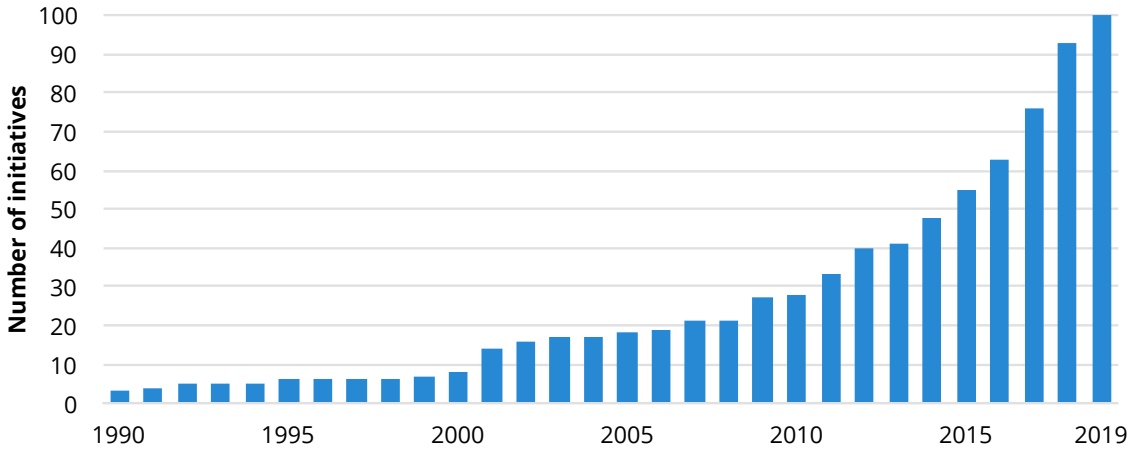
- In October 2019, the European Union (EU) launched the International Platform on Sustainable Finance (IPSF) as part of the international efforts to meet the Paris Agreement commitments.

- Support for the Financial Stability Board's Task Force on Climate-related Financial Disclosures (TCFD), launched in 2015 to develop voluntary, consistent climate-related financial risk disclosures, has grown to more than 1,000 organizations, representing a market capitalization of over US$12 trillion.[23]

The years after the adoption of the 2030 Agenda have witnessed a dramatic acceleration in the number of sustainable finance partnerships combined with an increase in the complexity and number of financing instruments. The UN's Inter-Agency Task Force on Financing for Development (IATF) highlights that many of these instruments for the mobilization of private funds (such as credit enhancements, risk sharing facilities, blended finance) are increasingly used in development cooperation and account for more than 1,000 instruments or modalities.[24]

An increasing number of partnerships at the international, national and market-based levels have driven the overall transition towards a sustainable financial system capable of delivering a sustainable real economy. As Figure 2 shows, the growth of sustainable finance partnerships at these three levels between 1989 and 2019 displays a seemingly exponential trend, with a significant acceleration in the number of initiatives established from around 2009 onwards.[25] During the first two decades, initiatives were established at a rate of approximately 1 per year, but for the 2009-2019 period, this rate increased to 7.4 per year.[26]

FIGURE 2. EVOLUTION OF SUSTAINABLE FINANCE INITIATIVES OVER TIME

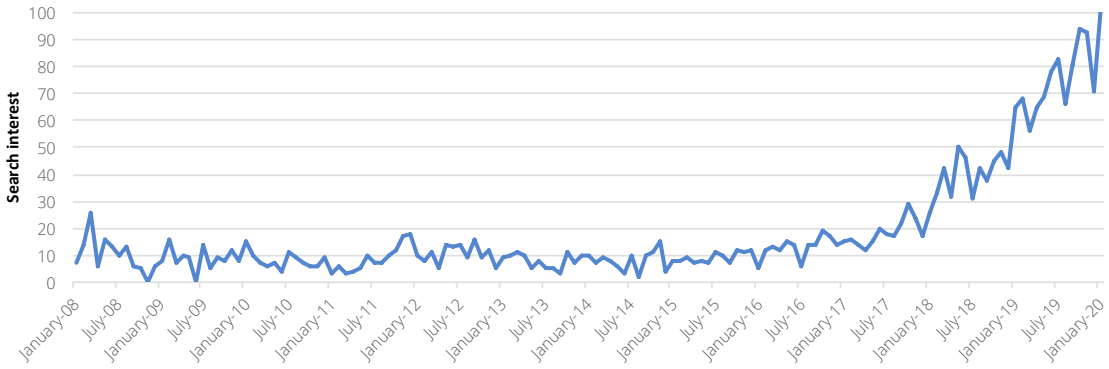


Source: UNEP Inquiry

Regardless of the level at which these partnerships were developed, their accelerated emergence and adoption is striking. Many financial institutions express confusion about the abundance of partnerships,[27,28,29] which could be a barrier to catalyse mass adoption.

This evolution and growing adoption is also captured in the increase (see Figure 3) of worldwide interest in the terms "sustainable finance" as the trend in Google searches term for the concept increased approximately eight-fold since 2015.[30]

FIGURE 3. RISING INTEREST WORLDWIDE IN THE SEARCH TERM "SUSTAINABLE FINANCE"



Source: Google Trends[31]

In its 2019 Financing for Development Declaration, the G7 recognized that among the "growing complexity of the development landscape", there is a need to support initiatives aimed at better measuring and increasing transparency on resources contributing to sustainable development and commended international initiatives aimed at promoting SDG-compatible finance.[32]

This increasing financial market complexity, paired with the challenge to mobilize sufficient financing for achieving the SDGs, has therefore put a premium on the strategic role that the development of national integrated financing strategies[33] can have to unlock and align financial flows to sustainable development and bring further coherence and standardization in regional and global financial markets. Box 2 provides an initial categorization of all recommendations in the more than 30 sustainable finance country roadmaps identified to date.

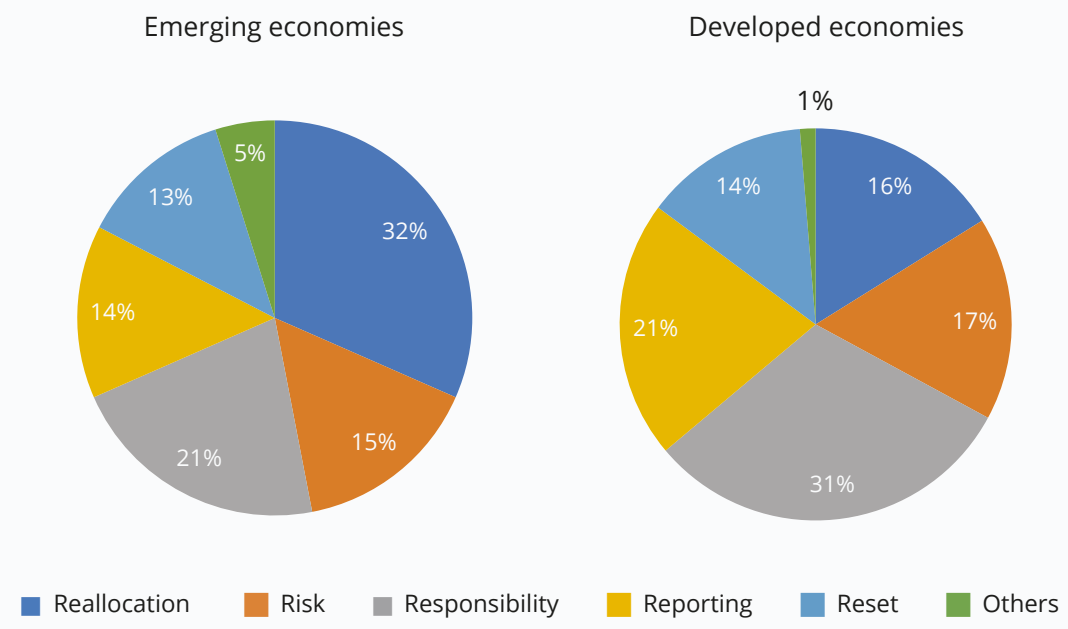
BOX 2. NATIONAL INITIATIVES: THE EMERGENCE OF SUSTAINABLE FINANCE ROADMAPS

Countries have shown growing interest in developing sustainable financial system policy frameworks (roadmaps) and taking more strategic approaches to scale up sustainable finance.[34] In addition, Integrated National Financing Frameworks (INFFs) have also emerged as a tool to implement the Addis Ababa Action Agenda.[35]

The IATF has identified 200 support initiatives to help countries strengthen their financing policies and develop INFFs. National sustainable finance roadmaps covering the entirety or parts of a country's financial system have been launched both in developed and emerging economies.

Even though their nature can vary and some can be more prescriptive than others, the development of roadmaps for sustainable finance has encouraged national conversations on the wide array of pathways that can be pursued to unlock capital for sustainable development. Unpublished research by the UNEP Inquiry has identified more than 30 country roadmaps and categorized more than 430 recommendations provided in the roadmaps under the Inquiry's 5Rs framework (Capital Reallocation and Raising, Risk, Responsibility, Reporting, Strategic Reset and Resilience). Results are presented in Figure 4.

FIGURE 4. SHARE OF RECOMMENDATIONS IN SUSTAINABLE FINANCE ROADMAPS BY CATEGORY



Source: UNEP Inquiry

3 Exploring the sustainable finance ecosystem: network analysis matters

As shown in Figure 2, the number of sustainable finance partnerships has grown substantially. Today, the sustainable finance ecosystem is a complicated network of actors, interrelations and interdependencies all working towards the same goal – delivering on the promise of an effective and inclusive sustainable financial system.

Why Network Analysis?

Network analysis is commonly used to model and draw meaning from large complex systems. In the case of social media, it has been used to represent how different individuals are connected with each other in a given context. The practical uses of network analysis are broad and widespread, ranging from the study of computer networks to biological networks and more.

This paper is an initial foray into exploring the relevance of network analysis. It is important to keep in mind that some of the longer-term research objectives of conducting network analysis within the sustainable finance ecosystem could include:

- Continued identification, mapping and characterization of existing networks according to their impact objectives;
- Examination and documentation of the kind of networks that deliver the most effective results or impact;
- Exploration of how soft norms (principles) and explicit norms (rules) can help design, shape networks and promote market adoption; and
- Identification of modalities and mechanisms that might enable and maximize network coordination and linkages.

4 Results

4.1. General network analysis: key findings

The aim of network analysis is to represent and analyse the relationships between discrete entities within a system. The primary tool for network analysis is a network graph,[36] consisting of nodes (representing entities) and edges connecting the nodes (representing the relations between them), thus forming a network.

The partnerships are understood to form the principal nodes from which the rest of the network branches. Specifically, each partnership is connected to its constituent member entities (the countries, institutions, organizations, entities in the partnership) by an edge. Therefore, a member belonging to several partnerships has multiple edges from its node to each of the relevant partnership nodes. These nodes and their interconnection by edges constitute the network.

In this analysis, edges have no clear origin or destination (indicating that the edge is undirected), and no weight, indicating only if the relation exists but not its strength or direction (in/out degree centrality).

Each node has two additional properties: its colour and its size. In the most general graph, the colour of the node is determined by the category of the entity to which it belongs (partnership, bank, asset manager, country, etc.). These colours are clarified in the legend. In some specific graphs, node colours are used to highlight certain parts or characteristics of the network. Secondly, a node's size is determined by the number of edges which branch from it, i.e. the number of other entities to which the entity is connected.

Conceptual and implementation challenges complicate network analysis because the sustainable finance ecosystem has a vast range of actors and modalities for engagement. For example, the complexity of the sustainable finance network is evidenced in Table 1, which shows a network composed of 115 different "partnerships", 5,181 constituent members and more than 10,000 connections. This type of network can be defined as a "multimodal network" as it includes different types of nodes (such as coalitions or associations). The scope of the partnerships includes all alliances, coalitions, networks, pacts,

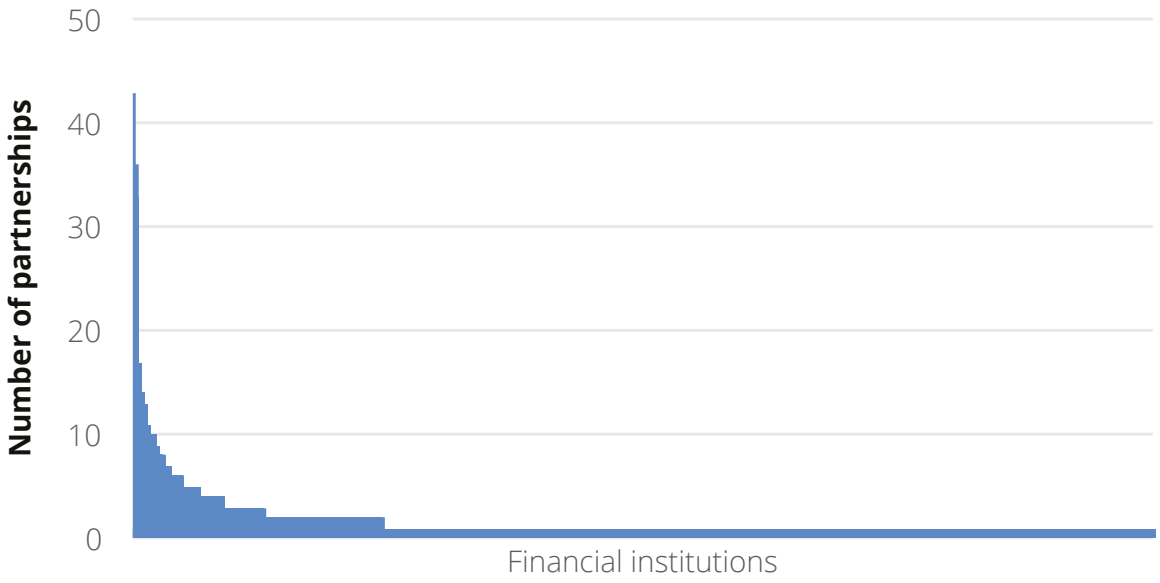
agreements, forums, etc. working on sustainable finance[37] and involving several actors relevant to the (global or local) financial system.

TABLE 1. CONSTITUENT MEMBERS OF THE SUSTAINABLE FINANCE NETWORK

Investment Manager	2028	Stock Exchange	108
Non-financial	598	Development Bank	48
Banks[38]	526	Real Estate Investment	36
Country[39]	432	International Organization	31
Asset Owner	395	Law Firm	25
Non-profit/NGO	244	Financial Centre[40]	7
Other Financial	202	Trade Union	6
Professional Services	197	International Financial Institution	3
Insurance Provider	177	Association/Federation	151
Research/Academic Institution	118		

The connections between the different network constituent members and the partnerships exhibit a Poisson distribution (Figure 5), where a small number of market actors have a high number of connections to the different partnerships and a high number of market actors have a low number of connections.

FIGURE 5. NUMBER OF PARTNERSHIPS PER NETWORK CONSTITUENT

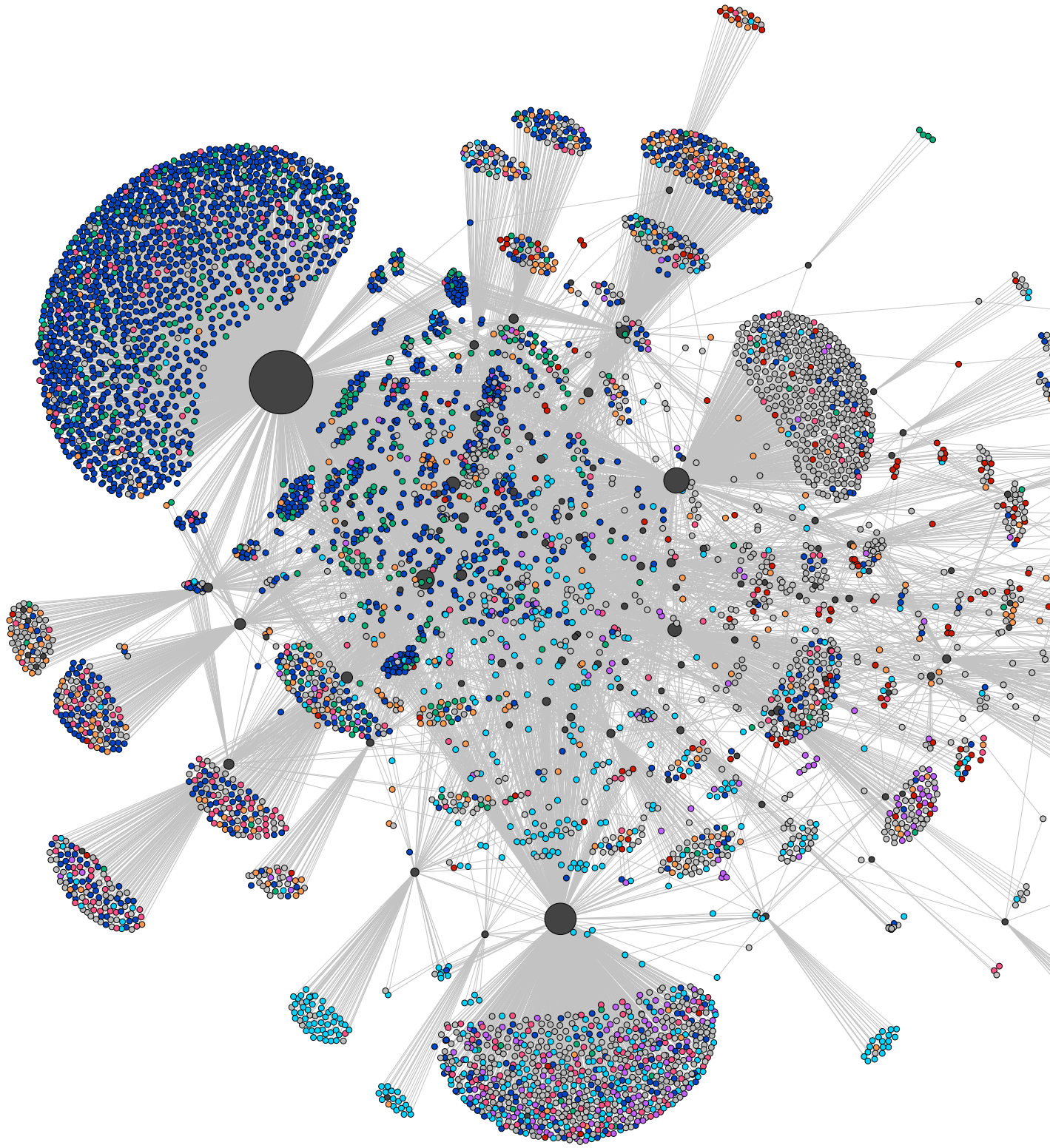


Source: UNEP Inquiry

The number of partnerships to which any network constituent is related could be used as a proxy for the level of alignment of its corporate agenda to sustainability, with great caution.[41] Further research on the categorization of activities and impact achieved by these initiatives in influencing the private financial agenda is needed to better understand which ones can be considered effective drivers of change.

Graphing sustainable finance partnerships via network analysis reveals new ways of looking at how and to what extent partnerships are leveraging linkages and scaling up via interconnected nodes. Figure 6 shows the general network graph, depicting all sustainable finance partnerships and member entities identified by this paper.

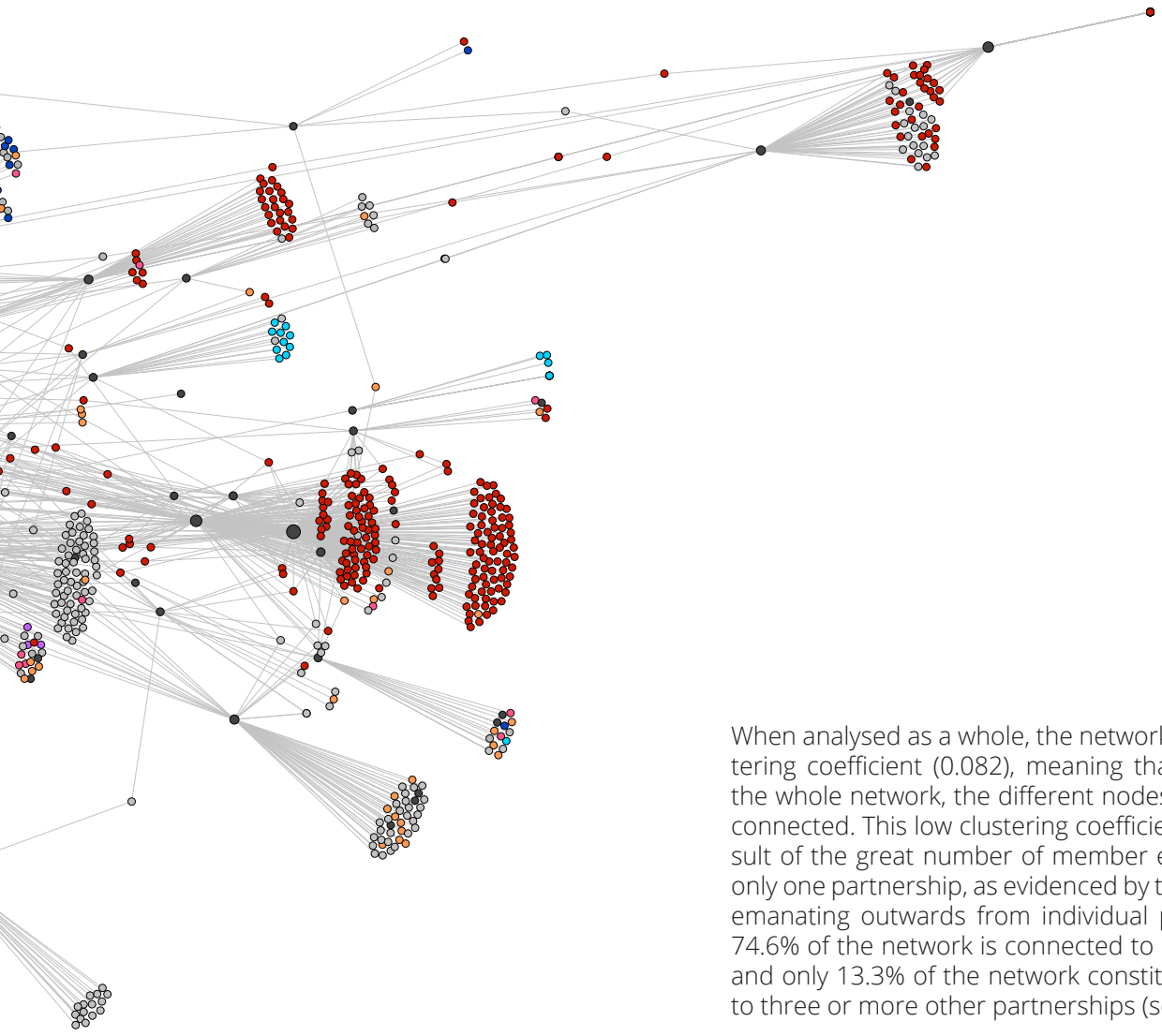
FIGURE 6. GENERAL SUSTAINABLE FINANCE NETWORK GRAPH



Source: UNEP Inquiry

	Other Financial	(4.32%)
	Insurance Provider	(3.2%)
	Association	(2.56%)
	Partnership	(2.32%)
	Research/Academic	(2.1%)
	Stock Exchange	(1.74%)

	Investment Manager	(34.02%)
	Non-Financial	(11.74%)
	Bank	(8.94%)
	Country	(7.48%)
	Asset Owner	(6.75%)
	Professional Services	(5.63%)
	Non-Profit/NGO	(5.13%)

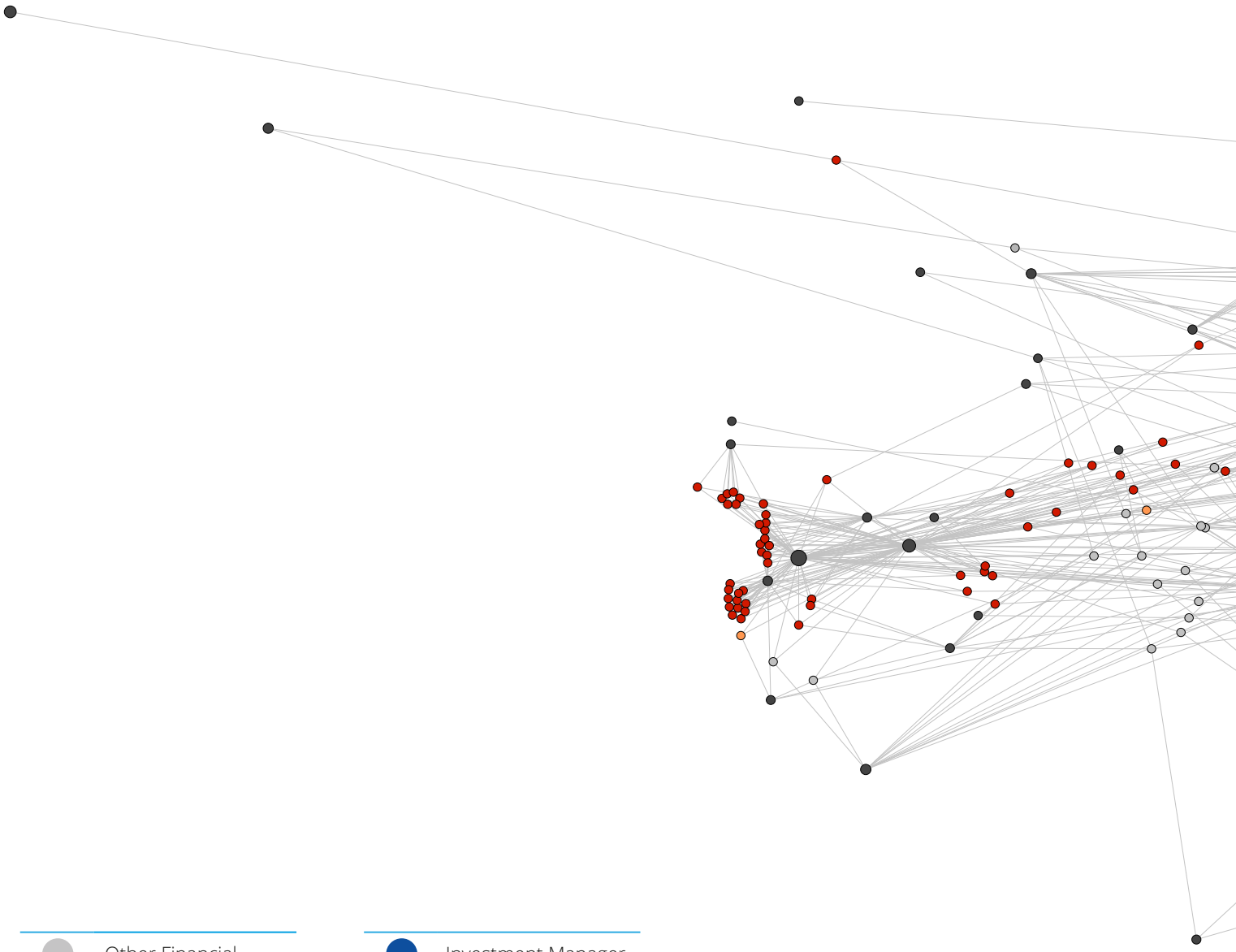


When analysed as a whole, the network presents a low clustering coefficient (0.082), meaning that, when considering the whole network, the different nodes are not significantly connected. This low clustering coefficient is most likely a result of the great number of member entities connected to only one partnership, as evidenced by the fan-like structures emanating outwards from individual partnerships. In fact, 74.6% of the network is connected to only one partnership and only 13.3% of the network constituents are connected to three or more other partnerships (see Figure 7).

The network is also rather small, as the average length of the path from any two different nodes is 3.67 on average, any node in the network is at less than four degrees of separation from anyone else. This means that any network constituent can 'navigate' the network quite easily.

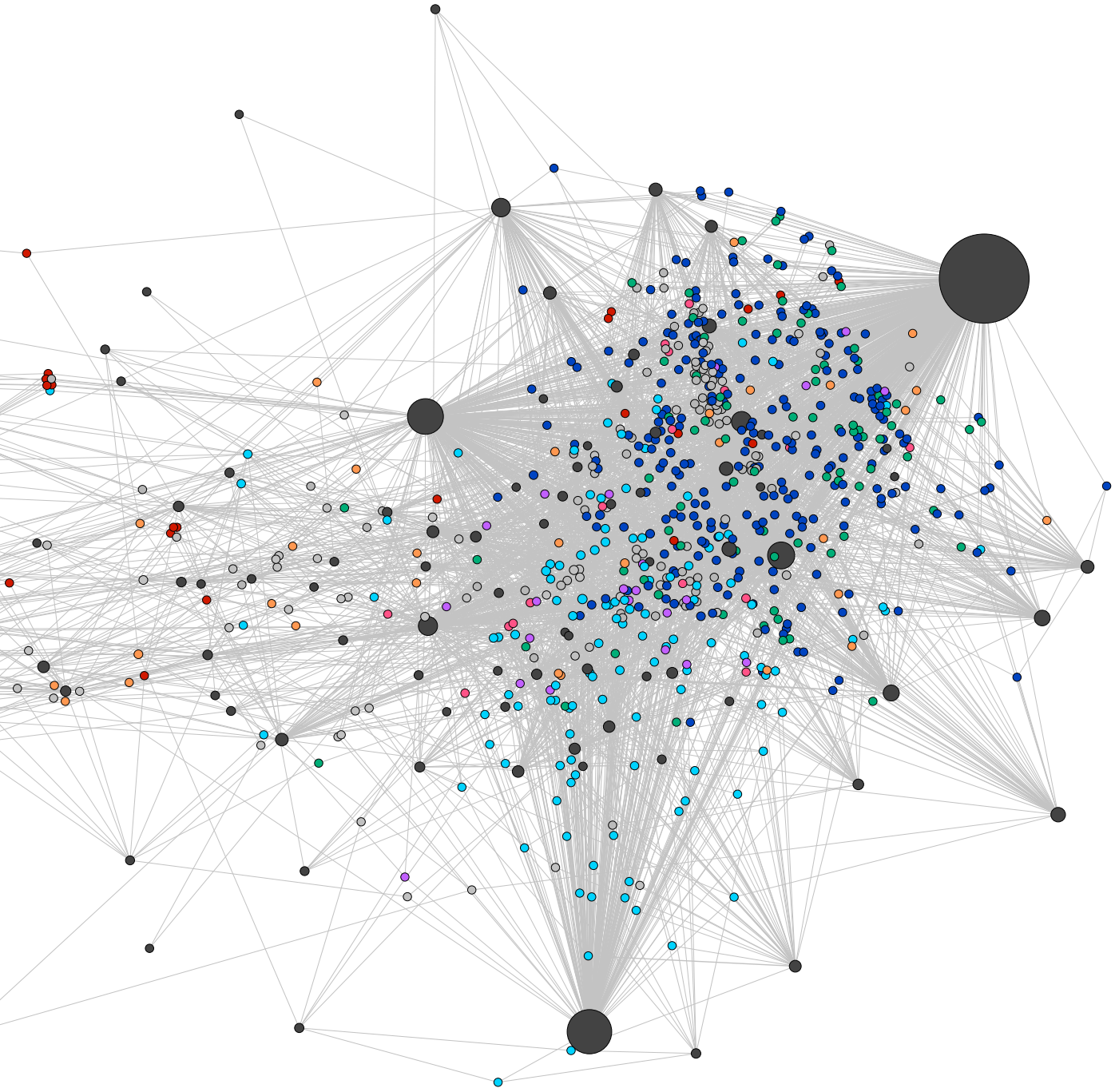
In this context, having a higher degree of centrality, the institutional role of different partnerships or UN agencies as connectors between different nodes becomes increasingly important for sharing knowledge, promoting the adoption of institutional frameworks (such as the TCFD) or encouraging system-wide collaboration.

FIGURE 7. NETWORK GRAPH LIMITED TO NODES WITH THREE OR MORE CONNECTIONS



- Other Financial
- Insurance Provider
- Association
- Partnership
- Research/Academic
- Stock Exchange
- Investment Manager
- Non-Financial
- Bank
- Country
- Asset Owner
- Professional Services
- Non-Profit/NGO

Source: UNEP Inquiry



Future analysis could help distinguish the direction of the edges (asymmetric edges) and their strength within different relations in order to more effectively map network density and centrality measures. Such an analysis could improve our understanding of how to promote network-wide coordination and collaboration efforts.

Further examination of the network structures and composition could help in understanding how different sustainable finance partnerships could more effectively leverage networks and help define and achieve specific goals more effectively such as, for example, developing a more effective framework for SDG-compatible finance.

4.2. Country (financial regulator) network analysis: key findings

For this analysis, 6.8% of the network consists of "regulators", defined as governments, regulatory authorities, central banks, etc.

The involvement of regulators exhibits the same distribution referenced in Figure 5: a few regulators are highly involved in the network, and interact with or belong to several partnerships, while the rest is not and primarily located towards the periphery of the network. Most of them (87%) have a degree lower than three, which could be due to the relatively recent establishment of many of the financial regulatory networks. Box 3 presents a detailed analysis of the network constituents of the major sustainable finance regulatory networks.

About half of the 'regulators' with three degrees or more are in developing country, indicating this is not an agenda promoted solely by developed countries. This is important, as developing countries are more exposed to the impacts of climate change and will require significantly more financing to achieve the objectives set forth by the 2030 Agenda.

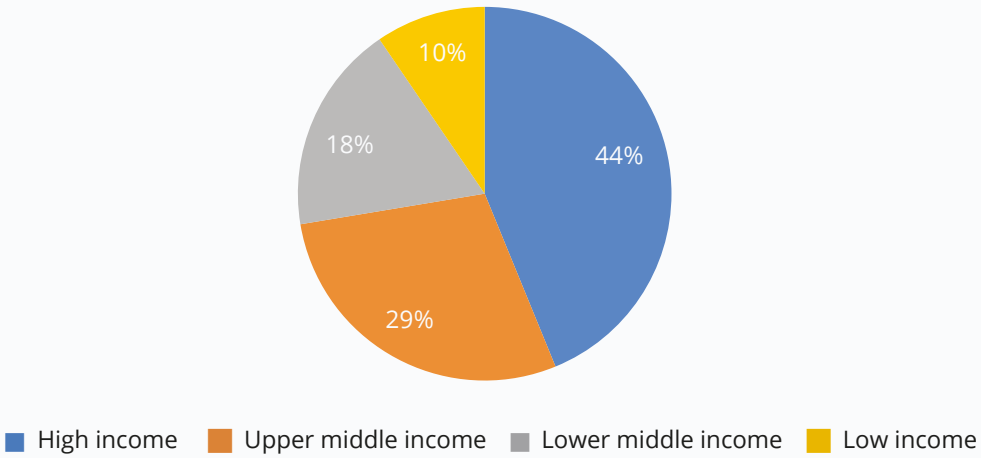
BOX 3. SUSTAINABLE FINANCE REGULATORY NETWORK ANALYSIS[42]

Several networks of financial regulators focusing on how to better align the financial system to sustainable development have emerged during the past few years. These networks bring together 106 countries or regulators that account for more than 90% of the world's GDP and trade. While some of the networks considered in this analysis are more encompassing (extensive) than others, there is an average overlap of 40% between the different networks (Figure 8) which presents a great opportunity to increase coordination and collaboration among networks leveraging on each other's core competencies.

FIGURE 8. OVERLAP BETWEEN SUSTAINABLE FINANCE REGULATORY NETWORKS (NEXT PAGE)

Additionally, an analysis of the composition of the financial regulators who are members of these networks showed that approximately 70% belong to either high-income or upper-middle income countries (see Figure 9). The growth of financial markets in developing economies will be instrumental to unlock funding from the private sector. Therefore, IOs with broad regional presence can play a strategic role to further expand in low-income and lower-middle income countries the work done in this sustainable finance regulatory networks.

FIGURE 9. DISTRIBUTION OF REGULATORS ACCORDING TO COUNTRY PER CAPITAL INCOME LEVEL



Source: UNEP Inquiry

Over the past five years, the number of measures taken by financial policymakers and regulators to promote green and sustainable finance has significantly increased, transforming the "quiet revolution" to an amplifying momentum. The emergence of the different financial regulatory networks, several of them recent, has certainly contributed to this acceleration. As of October 2019, there are more than 390 policy and regulatory measures implemented at national, sub-national, and regional levels. This represents a 25%[43] increase from end 2018 and nearly a doubling from end 2015.

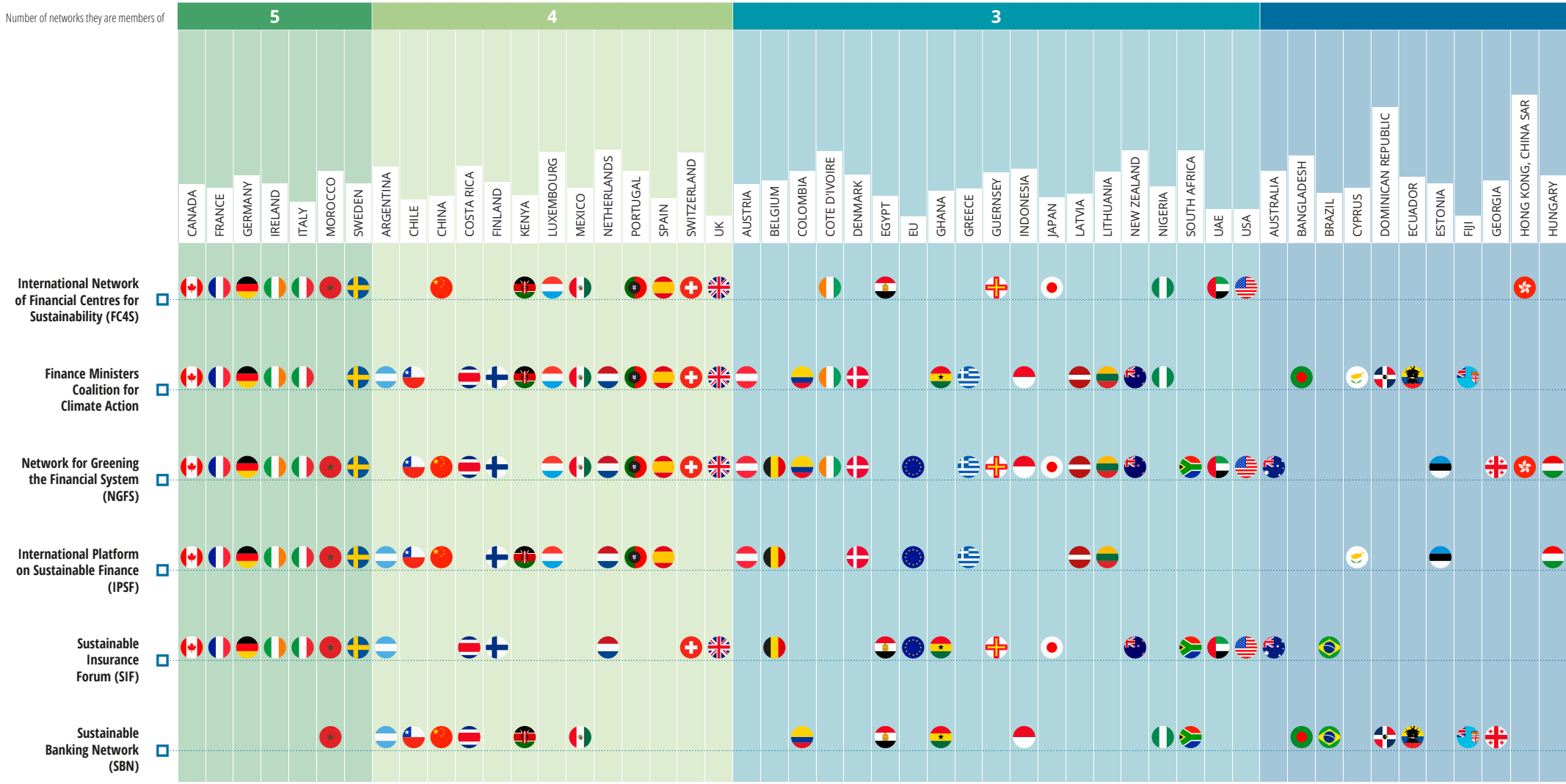
These policy and regulatory measures on green finance have a wide range of objectives and intended outcomes. The UNEP Inquiry broke new ground with an attempt to classify the objectives of policy and regulatory measures against its 5 Rs framework (see Box 4).

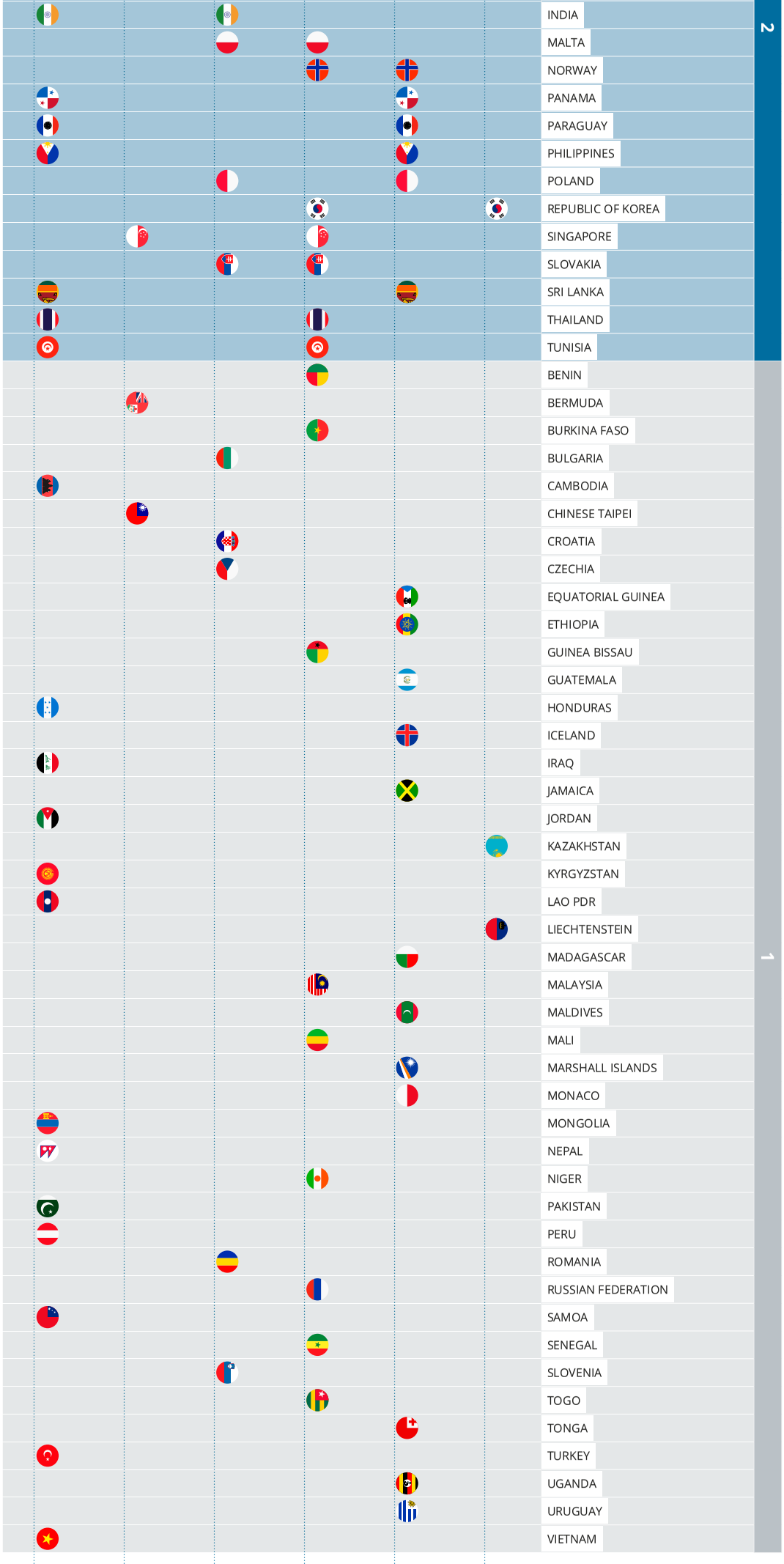
BOX 4. UNEP INQUIRY FIVE Rs FRAMEWORK

In its landmark report ***The Financial System We Need: From Momentum to Transformation***, looking across the range of policy and regulatory measures driving what was then a 'quiet revolution' the UNEP Inquiry identified five priority areas: capital reallocation; risk management; the responsibilities of financial institutions; reporting and disclosure; and strategic reset (the 5Rs), described here in further detail:

- **Reallocation and raising of capital:** Measures to promote the capital allocation to green sectors, such as fiscal incentives (e.g. preferential refinancing) for investments in green assets, as well as the introduction of frameworks to support product development (e.g. green bonds).
- **Risk management:** Measures to strengthen environmental risk management practices within institutions, for instance through the introduction of climate change risks into supervisory frameworks.
- **Responsibility:** Measures to clarify the responsibilities of financial institutions with respect to environmental factors within capital markets, such as clarifying the relevance of ESG issues within the context of fiduciary duties of pension funds,
- **Reporting and disclosure:** Measures to strengthen the flows of information relating to environmental factors within the financial system, for instance requirements for public disclosure of climate-related risks to investment portfolios
- **Reset:** Broad measures to align groups of institutions, or the financial system itself, with environmental outcomes and sustainable development objectives, for instance the development of national roadmaps for sustainable finance.

FIGURE 8: OVERLAP BETWEEN SUSTAINABLE FINANCE REGULATORY NETWORKS




INDIA
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NORWAY
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POLAND
REPUBLIC OF KOREA
SINGAPORE
SLOVAKIA
SRI LANKA
THAILAND
TUNISIA
BENIN
BERMUDA
BURKINA FASO
BULGARIA
CAMBODIA
CHINESE TAIPEI
CROATIA
CZECHIA
EQUATORIAL GUINEA
ETHIOPIA
GUINEA BISSAU
GUATEMALA
HONDURAS
ICELAND
IRAQ
JAMAICA
JORDAN
KAZAKHSTAN
KYRGYZSTAN
LAO PDR
LIECHTENSTEIN
MADAGASCAR
MALAYSIA
MALDIVES
MALI
MARSHALL ISLANDS
MONACO
MONGOLIA
NEPAL
NIGER
PAKISTAN
PERU
ROMANIA
RUSSIAN FEDERATION
SAMOA
SENEGAL
SLOVENIA
TOGO
TONGA
TURKEY
UGANDA
URUGUAY
VIETNAM
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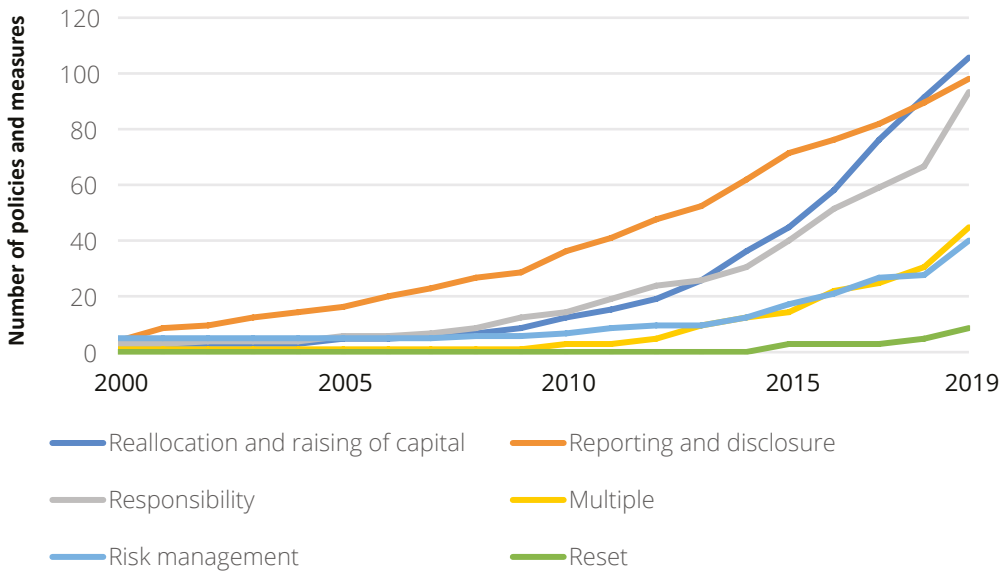
1
27

The evolution of the different policy and regulatory measures across the 5Rs is represented in Figure 10.

FIGURE 10. EVOLUTION OF GREEN FINANCE POLICY AND REGULATORY MEASURES (5Rs FRAMEWORK)



Reporting and disclosure remains the most critical priority for policy and regulatory action, comprising 27% of all measures. However, since 2013, there has been a step change in the implementation of measures aimed at other objectives, including capital reallocation, responsibilities of institutions (including fiduciary duties), and risk management. Additionally, an increasing number of measures are targeting multiple asset classes – with policy frameworks tackling systemic issues (e.g. climate change risk) across banking, investment, and insurance.

Slightly more than two thirds of the measures (68%) are implemented in developed economies, while one third (32%) are implemented in developing and emerging economies, which also reflects the overall regulatory networks composition analysis presented above.

While the recent emergence of financial regulatory networks has likely helped accelerate the growth in green finance policy and regulatory measures, the composition and reach of these networks also reflects the lag observed in developing countries to implement policy and regulatory measures to further align their financial systems to sustainable development.

4.3. Financial institution network analysis: key findings

This section examines the involvement in the international sustainable finance agenda for the largest asset owners, asset managers, banks and insurance providers. It serves as a first approach to inform ongoing research, policy and regulatory discussions on how climate-related risks can be potential sources of financial stability risk and complement the understanding of the interconnected nature of financial institutions and the risks they pose to the financial system when they are in distress.

The analysis of interconnectedness and contagion is an important part of the financial stability and risk assessment of a country's financial system.[44] To this extent, the Financial Stability Board (FSB), in consultation with the Basel Committee on Banking Supervision (BCBS) and national authorities, has identified global systemically important banks (G-SIBs)[45] since 2011.

Additionally, the International Monetary Fund (IMF),[46] the European Central Bank (ECB)[47] and the Bank of England (BoE)[48] have underscored, in their respective financial stability reports, that regulation restricting banks' ability to finance the real economy has seen the growth of lending by funds and institutional investors. This, paired with low market yields, has pushed investors towards riskier assets, which can create potential for sell-offs and spillovers.[49] For this purpose, this analysis covers G-SIBs and the twenty largest insurance providers,[50] asset owners and asset managers.[51]

Our analysis[52] shows that, on average, both banks and asset managers were involved in more than 10 initiatives, making them more central to the network than insurance providers and asset owners. Despite having similar means, the top 20 asset managers and banks exhibit a wide spread in the number of initiatives involved. Banks have the largest spread (between 0 and 43) and standard deviation (10.3), indicating that, while there are a few leaders frequently involved in most of the activities in the sustainable finance space, there are also some institutions with a rather nascent sustainability agenda within those considered as G-SIBs.

Asset owners and insurance providers exhibit the lowest connectivity to the network, with a mean degree of 2.5 and 4.1 respectively. Insurance providers[53] have a higher degree range (between 0 and 27) and standard deviation (8.1), indicating that, as in the banking sector, while some insurance providers are frequently involved in the partnerships mapped in this network, others are not.

TABLE 2. FINANCIAL MARKET ACTORS NETWORK ANALYTICS

	Asset Owners	Assets Managers	Banking	Insurance Provider
Number of nodes mapped	395	2028	526	177
Mean degree	2.5	10.5	13.2	4.1
Median degree	1	8.5	13	0
Degree range	0 - 11	2 - 27	0 - 43	0 - 27
Degree standard deviation	3.6	7.6	10.3	8.1

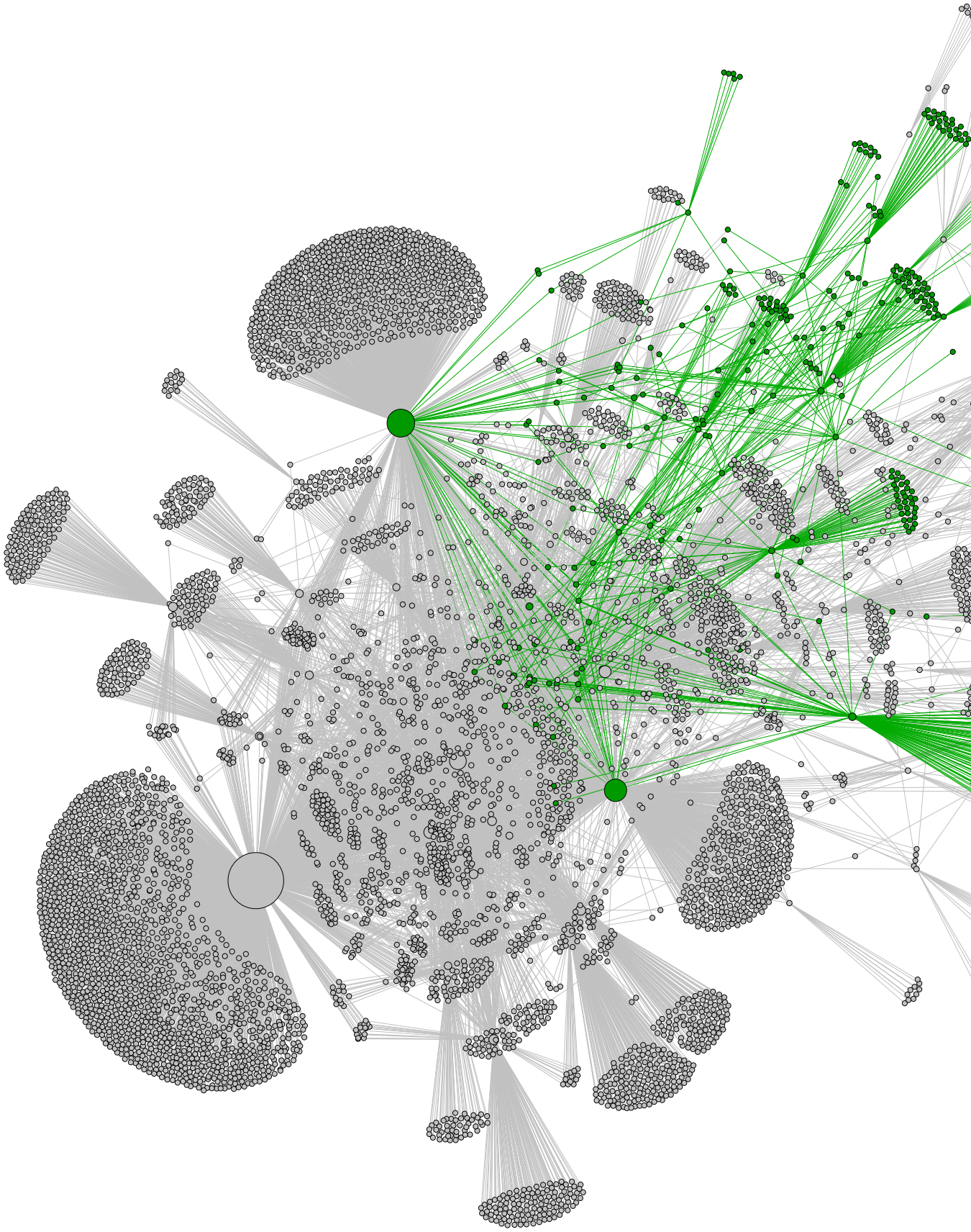
Notably, since many of the partnerships mapped in this sustainable finance network act as a "soft law",[54] further work is needed to determine the effectiveness of these partnerships and whether their commitments, pledges or pacts are able to drive positive environmental and social impacts.

4.4. Regional case study analysis: Latin America

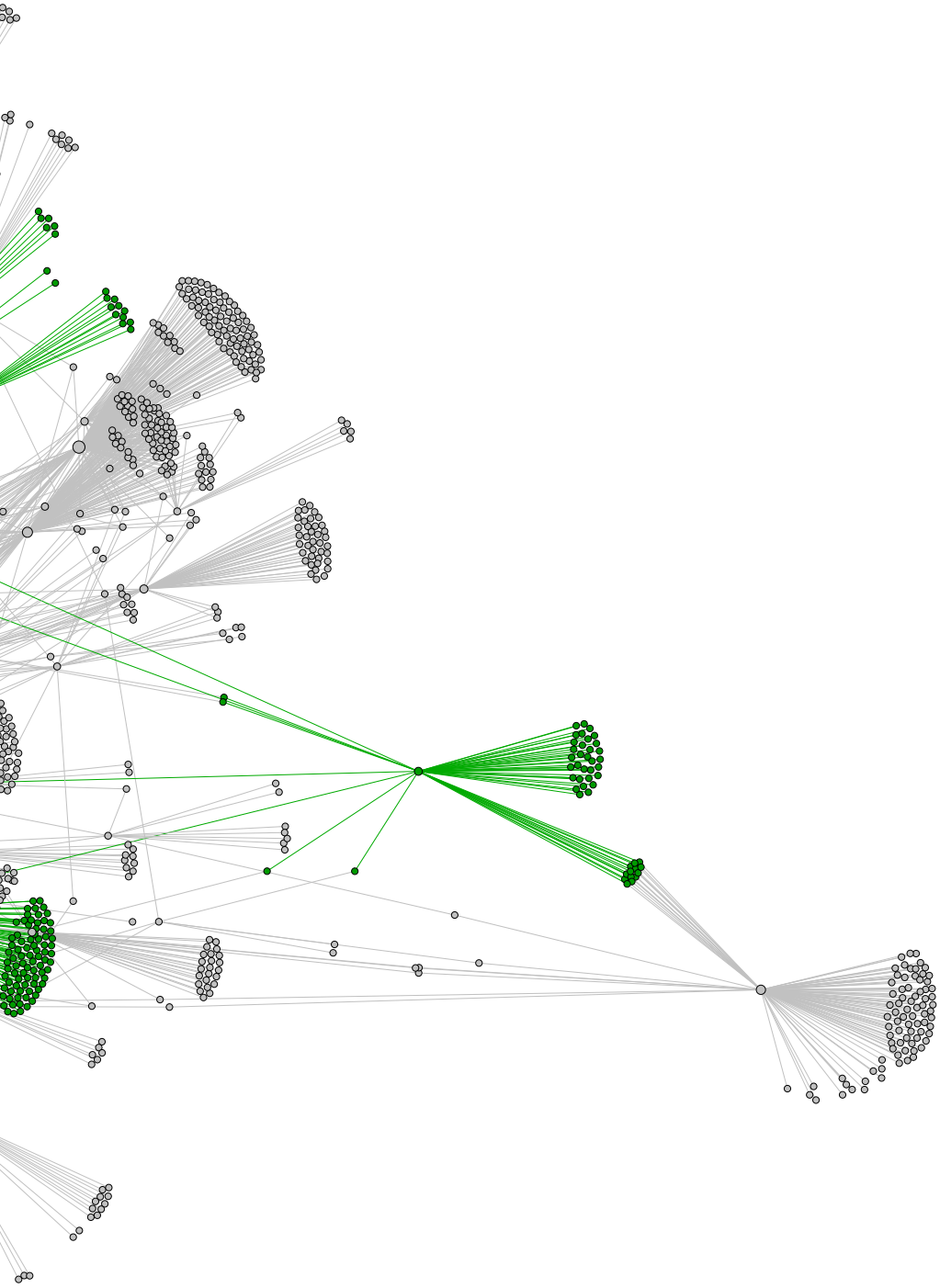
Latin America was chosen as a regional case study given its importance in terms of biodiversity[55] and the strong presence of the UNEP Inquiry network through its financial system work in Argentina, Brasil, Colombia and Mexico. The different associations and federations, such as the Federación Latinoamericana de Bancos (FELABAN) or the Federación Iberoamericana de Bolsas (FIAB), served as an entry point to identify and map all financial market actors, some of which were already involved in different partnerships in the sustainable finance network described above.

The relation of the sustainable finance partnerships with the broader financial market actors from Latin America is depicted in Figure 10. Financial market actors and their associations or federations are represented by the fan-like structure in green. Given that very few of its members, as a percentage of the total number, are involved in sustainable finance partnerships, the associations or federations and their members are located towards the periphery of the network.

FIGURE 11. LATIN AMERICA SUSTAINABLE FINANCE NETWORK CASE STUDY



Source: UNEP Inquiry



The example of Latin America provides quite an accurate description of how social networks are usually organized, structured into highly connected clusters with a few links connecting these clusters that keep them from being isolated from the rest of the world.[56] In this example, these clusters are represented by different industry associations.

This paper posits that the strength of a tie between a partnership and the financial market actors is a combination of the amount of time interacting with each other (measured by the number of emails exchanged, the participation in events, the implementation of "partnership" initiatives, etc.) and the reciprocal benefits (alignment of corporate agenda with sustainability agenda).

The case study provides an accurate depiction of the bridging role that industry associations can play as a pathway to enhance sustainable finance adoption.

Sustainable finance initiatives usually target financial market actors. However, as seen in Table 2, a small number of institutions usually adopt these initiatives, generating a wide spread in the adoption of initiatives. This might be the start of a sustainability divide, where a few groups of emerging sustainability leaders are frequently seen as the early adopters and a large majority of the others are left on the side.

Industry associations or federations could serve as potential entry points to promote the widespread adoption of sustainable finance practices. However, engagement by IOs with industry associations is often perceived as fragmented and, given that the ultimate beneficiary of the partnerships is the financial institution itself, there is also a lack of institutional bandwidth from IOs to provide adequate levels of support to industry associations.

Further analysis could complement this mapping by integrating other regions. This could improve understanding of their connectivity, as well as how to leverage this connectivity to promote alternative sustainable finance diffusion pathways.

5 Conclusions

Increased understanding of sustainable finance via a network analysis approach can allow for a greater alignment of sustainable finance partnerships. It can also identify positive pathways for cascading sustainable finance into the wider financial system to accelerate and catalyse the trillions needed to finance the 2030 Agenda.

In the same way that mapping trade exchanges between countries facilitated the comprehension of global supply chains, mapping the sustainable finance ecosystem allows understanding the structure and topology of the network so as to navigate it, facilitate and influence the innovation diffusion processes, and understand the spread and integration of the best sustainable finance practices.

Evidence from initial mapping efforts suggests that sustainable finance partnership networks are often structured into highly connected clusters, but with a few links connecting these clusters to the rest of the finance world.

Analysis suggests that the strength of a tie between a partnership and financial institutions is a combination of the amount of time (measured by the number of emails exchanged, the participation in events, etc.) and the reciprocal benefits (alignment of corporate agenda with sustainability agenda). The stronger the tie between any two nodes in the sustainable finance ecosystem, the larger the proportion of individuals to whom they will both be tied, either by a weak or strong tie. Weak ties play a crucial role in the diffusion process of sustainable finance, as they are the sustainable finance link to the broader financial ecosystem. Nodes (such as industry associations) with many weak ties to the core sustainable finance ecosystem are best placed to diffuse and promote the adoption of market innovations, acting as local bridges. This means that what is diffused can reach a larger number of people, and travel further when passed through weak ties rather than strong.[57]

Yet, early innovators appear to be central to this network. Unlike some other innovation diffusion processes, where early adopters are more peripheral to the network since they might have a greater risk appetite, central figures are leading in this adoption. This could be due to a larger desire of "central" figures to protect their sustainability reputation as sustainable finance leaders, a true commitment to sustainable finance, or an ease of access to be involved in new initiatives that are being promoted by IOs targeting big capital.

IOs promoting a new initiative appear to gravitate towards the 'usual suspects'. New initiatives are proposed to those with whom the ties are strong, thereby increasing the sustainable finance divide. In this sense, one could argue that international development agencies are part of the problem. What are the pathways through which new market actors can be reached? If more market actors can be reached through weak ties, what are the weak ties that can be leveraged? And how can we develop a more strategic and resource-effective approach to tracing out paths along which diffusion could take place?

These small-scale interactions become translated into large-scale network behaviour, which in turn feed back into other small-scale interactions. How does the interaction within small groups aggregate to form a large-scale behaviour or pattern that can affect system-wide adoption of sustainable finance political organization? This question exceeds the scope of this study but could be the subject of further research.

- What are the different approaches that, by leveraging network understanding, can be taken to achieve specific goals (such as greening the financial system)?
- How do we measure the spread of the adoption and alignment of the financial system to the 2030 Agenda?

Considering the acceleration and evolution of sustainable finance initiatives depicted in Figure 1, what is the role that IOs could play and how could this role evolve?

Given the growth in network partnerships presented in Figure 1, an effort by members of a sustainable finance network to increase and broaden the coordination of their activities can help the network develop, as well as express and sustain a more coherent structure at a higher level. This will allow for increased efficiency in system-wide outcomes and help to green the financial system.

Overall, enhanced knowledge about how sustainable financing partnerships function as networks allows for increased efficiency in system-wide outcomes to align the financial system with the objectives set forth by the 2030 Agenda. Additionally, network analysis could potentially be expanded to a country by country approach.

6 Recommendations for future work

Borrowing terminology from a biological systems analysis, mapping and exploring "the connective tissue" of the sustainable finance ecosystem will help better understand its complex interdependencies and network effects.[58] This will also enable to identify specific drivers of change to influence regulatory and market practices and effectively drive the financial system to deliver on the 2030 Agenda.

In the same way that network maps can help guide us through social landscapes, this approach will help understand how to accelerate the diffusion processes and navigate the challenges of policy design.

The broad issues for future work that are recommended for consideration as a result of this initial paper on network analysis include:

- A systems approach that can explain interdependent relationships of the major agents driving the sustainable finance agenda;
- Identification of the potential for common but complementing approaches and institutional strategies on sustainable finance;
- Offering insights into areas where there are opportunities for scaling up or strengthening coordination in existing or new sustainable finance areas;
- Aligning the sustainable finance organizational strategies of IOs, donor members, NGOs and MDBs with wider ecosystem efforts to complement and catalyse work done by governments and private sector actors; and
- Providing a strategic resource for the work done by UNEP and other agencies to better fine-tune their organizational approach and strategic considerations on sustainable finance and contribute to the ongoing efforts to deploy the UN Secretary-General's Strategy for Financing the 2030 Agenda.

In the future, this network analysis approach could also be used to work on network categorization, impact measurement and network intervention. This information will be useful to member agencies, member states, sustainable finance practitioners and a wider audience looking to understand the space or identify opportunities to address any overlooked areas of work that can promote further alignment of the financial system with the 2030 Agenda.

Finally, IOs could adopt a more coordinated approach to develop effective institutional support that will allow for increased efficiency in system-wide sustainable finance partnership outcomes. As an example is, the ongoing UNDP Finance Sector Hub and UNEP Inquiry partnership on sustainable finance in responding to country interest on developing Integrated National Financing Frameworks, which builds on UNDP's country presence and the UNEP Inquiry's track record of engaging with financial regulators and policymakers to align the financial system to sustainable development.

Areas for more specific and targeted work include:

Network Categorization: Collective behaviour is shaped and constrained by the way in which different actors interact in this sustainable finance network. Further examination of the network structure and composition will allow us also to understand weather aspects of its structure might facilitate the organization to achieve common goals more easily and effectively or necessary.

Additional aspects of network categorization can include:

- Developing edge directionality and weighting to enhance approximations toward real-world behaviour of institutional networks;
- Inclusion of financial institution's headquarter country to correlate with country's financial regulation involvement;
- Complementing the regional analysis for Latin America and extending the analysis of the financial system and its relation to the sustainable finance network to other regions to better understand potential regional entry points;
- Categorizing sustainable finance partnerships by area of work based on the 5Rs framework, structure (principle-based, target-based, etc.), nature (public or private), etc.;
- Identifying additional financial system stakeholders that can be influential to advance the sustainable finance agenda; and
- Identifying flows of social media interactions, co-authorships, citations on reports on sustainable finance and their link to reports on real economy.

Impact Measurement: Aside from capturing the connective tissue of the sustainable finance network, evaluating the system-wide impact of the different partnerships can help in the prioritization of different network interventions. There is a growing recognition of the need to work towards greater standardization in the way the different "partnerships" and market actors within the sustainable finance ecosystem measure their contribution to the SDGs and avoid 'SDG washing'.

While this current mapping exercise has not considered a framework for network impact, the future development of such a framework could consider the size of the node with the following variables:

- Number of connections;
- Enforcement, reporting, transparency and monitoring mechanisms (internal review process, compulsory reporting and third party oversight, exclusion mechanisms, etc.);
- Generation of knowledge (number of publications);
- Provision of technical assistance (number of tools, country work, working groups, etc.);
- Communications reach (social media reach, mainstream media positioning, etc.); and
- Other modalities (such as membership fees).

UNEP internal network analyses can aid with understanding and strengthening the flows and integration between sustainable finance and green economy work undertaken within the organization.

Network Interventions – Cascading Pathways: While there is no single best sustainable finance network structure, understanding how a particular network configuration aligns to certain strategic objectives (such as the 2030 Agenda) can help us develop particular network interventions pathways to 'nudge the system'. Being able to evaluate how network building blocks matter for system-wide performance will allow us to suggest specific actions tailored to intervene in the network and improve collaboration patterns. In our case, focusing on further network categorization and impact measurement will allow to propose different cascading pathways to help specific partnerships enhance their impacts.

This future research will also highlight the relationship between financial system complexity and financial policy and regulation from the perspective of the search for new regulatory tools to further align the financial system with sustainable development.

ANNEX 1: METHODOLOGY

Populating the list of network member took place in two stages: online research and regional network expert interviews. Prior data sources available to the UNEP Inquiry provided a short initial list , which quickly expanded by conducting Google searches with varying combinations of search criteria such as "sustainable", "responsible", "green", "investment", "banking", "insurance", "partnership", "coalition" or "principles". The websites of the partnerships gave links to similar or related partnerships. Finally, mention of potentially relevant partnerships were looked in reports from the UNEP Inquiry, UNEP FI and other sources. Once online research did not produce new results, UNEP FI regional network coordinators and other sustainable finance specialists were interviewed. Specifically, these experts were asked to look over the list and add partnerships that were missing before the interview. During the interview, they gave clarifications on the partnerships added and, where relevant, supplied additional information regarding partnerships already on the list.

Variables

For each partnership on the list, specific information variables were included for later ease of use and reference. These included the partnership's number of members, creation date, geographic scope and focus (international, regional, or national; and where specifically if regional or national) and website address.

List of members

With the foundation being laid out by the partnerships, the network takes shape through the addition of the partnerships' members. Due to the broad scope of partnerships included, these members ranged from financial institutions to governments to non-profits. A list of members was created for each partnership and was primarily found through the partnership's website.

Cleaning and consolidation

To avoid double counting, the list of members was cleaned for false entries, misspellings, special characters, and then consolidated. Specifically, where differences in naming arose between member lists, the names were changed to that used on the organization's website. Moreover, all subsidiaries were consolidated under the parent organization's name (for example, BNP Paribas Asset Management became BNP Paribas). When multiple subsidiaries of the same organization were members of a partnership, each subsidiary was replaced its parent in the list. Therefore, a partnership's member list may contain an organization's name several times. Rather than combining all subsidiary entries into one parent entry, the number of entries was preserved to more accurately represent the parent organization's dedication to the partnership through its subsidiaries.

Categorization

Finally, the individual members were categorized to allow for mapping of the entity type. The categories used are:

- Asset Owner
- Association/Federation
- Bank
- Country
- Development Bank
- Financial Centre
- Insurance Provider
- International Financial Institution
- International Organization
- Investment Manager
- Law Firm
- Non-financial

- Non-profit/NGO
- Other Financial
- Professional Services
- Real Estate Investment
- Research/Academic Institution
- Stock Exchange
- Trade Union

Network creation and metrics

The lists of partnerships and members form the input for the creation of the network. The network graph itself was constructed using the graph visualization software Gephi (0.9.2). Each partnership and member entity is represented by a node, with an edge connecting them if the entity is in the partnership. The graph layout was achieved by starting with Gephi's initial, random layout and subsequently applying the Yifan Hu layout algorithm.

Node metrics

Each node has a given colour and size. The colour of the node is determined by its category (see above). In the network graphs displayed in this report, the size of a node is decided by its degree. The node with the highest degree has a size of 120 on Gephi's node size scale, while the smallest-degree node has a size of 11. The size of all other nodes varies linearly according to its degree within this size range. In later analyses, the node size may represent more complex metrics, such as centrality, network impact, or other measures.

Edge metrics

Edges have only one variable metric, which is their weight. The weight of an edge has a value of one or more and is graphically represented by the width of the edge. In this network, edge widths are greater than one when an organization has multiple connections to a single partnership. For example, a company may have multiple regional subsidiaries which are all part of the same partnership. In the consolidation stage, these regional subsidiaries were brought together into a single node with the name of the parent company. To more accurately represent the company's level of involvement in the partnership, the weight of the edge from the parent node corresponds to the number of subsidiaries which are connected to the partnership.

In this respect, including additional variables in the weight of the edges can help differentiate more accurately the strength in a relationship. For example, connections that represent "active" engagement between nodes (such as partnerships or joint ventures) may provide more valuable insights into networked action than "passive" engagement (such as observers in a network/coalition/alliance).

Limitations

The primary limitation of this study relates to the exhaustivity of the list of initiatives. As these were initially and primarily found through online research in English, the list consisted only of partnerships for which information was publicly available in English. Moreover, even after significant research, new initiatives continued to come to light every so often, and it is not implausible that some smaller initiatives have not yet been picked up. Therefore, a number of sustainable finance initiatives (whether foreign-language or not) may not be included in the network, unless they were captured in the second research stage of interviews with regional coordinators.

A second limitation is the availability of member information for the partnerships found. In some cases, a partnership's members are not clearly listed, even when the partnership has its own website. In such cases, the partnership is not included in the network.

ENDNOTES

1 As of October 2019, there are more than 390 policy and regulatory measures implemented at national, sub-national, and regional levels. This represents a 25% increase from end 2018 and nearly a doubling from end 2015.

2 UNEP FI (2019). From 1992 to 2019: The Evolution of Sustainable Finance. *https://www.unepfi.org/news/25th-anniversary/timeline/*

3 For example, cross-border payments reached US$144 billion in value in 2014 and could hit US$240 billion by 2024. See PYMNTS (2019). Global Cross-Border Payments Expected To Grow, But Challenges Remain. *https://www.pymnts.com/news/cross-border-commerce/2019/global-payments-growth-challenges*

4 FSB (n.d.). Monitoring of FinTech. *https://www.fsb.org/work-of-the-fsb/policy-development/additional-policy-areas/monitoring-of-fintech/*

5 *http://unepinquiry.org/?s=&post_type=publication*

6 Leon, C. and Perez, J. (2014). Assessing financial market infrastructures systemic importance with authority and hub centrality. Journal of Financial Market Infrastructures, 2(3), 67-87; Leon et al. (2014). Financial Stability and Interacting Networks of Financial Institutions and Market Infrastructures. European Banking Center Discussion Paper Series No. 2014-011. *http://dx.doi.org/10.2139/ssrn.2502832*; Roukny,T., Battiston, S. and Stiglitz, J.E. (2018). Interconnectedness as a Source of Uncertainty in Systemic Risk. Journal of Financial Stability, Volume 35. *https://doi.org/10.1016/j.jfs.2016.12.003*

7 Most of these investment approaches are managed according to "negative screening" or "corporate engagement and shareholder action". These approaches do not necessarily align with the Paris Agreement or the broader 2030 Agenda.

8 According to the 2018 Global Sustainable Investment Review by the Global Sustainable Investment Alliance, sustainable investing assets in the five major markets stood at US$30.7 trillion at the start of 2018, a 34% increase in two years.

9 Smart, L. (2018). ESG Meets Behavioral Finance: Part 1. *https://www.trucost.com/trucost-blog/esg-meets-behavioral-finance-part-1/*

10 Smart, L. (2018). ESG Meets Behavioral Finance: Part 2. *https://www.trucost.com/trucost-blog/esg-meets-behavioral-finance-part-2/*

11 Porter, M.E., Serafeim, G. and Kramer, M. (2019). Where ESG Fails. *https://www.institutionalinvestor.com/article/b1hm5ghqtxj9s7/Where-ESG-Fails*

12 See Moore, G.A. (1991). Crossing the Chasm. Harper Business Essentials.

13 World Economic Forum (2020). The Global Risks Report 2020. *https://www.weforum.org/reports/the-global-risks-report-2020*

14 Stupples, B. and Woolley, S. (2019). Rich Families Pour Wealth Into $31 Trillion ESG Opportunity. *https://www.bloomberg.com/news/articles/2019-09-16/wealthy-families-pour-fortunes-into-31-trillion-esg-opportunity*

15 Aside from the data pointing out the increasing trend in ESG-related investments, an emerging conversation is also questioning how much of these investments, which are primarily about owner transfer, are actually contributing to financing the Paris Agreement commitments or the 2030 Agenda.

16 Rogers, E.M. (1962). Diffusion of Innovations. New York, Free Press of Glencoe.

17 The Green Finance Study Group was renamed in 2018 to Sustainable Finance Study Group

18 Green Finance Study Group (2016). G20 Green Finance Synthesis Report. http://www.g20.utoronto.ca/2016/green-finance-synthesis.pdf

19 *https://www.ngfs.net/en/about-us/governance/origin-and-purpose*

20 *https://www.cape4financeministry.org/coalition_of_finance_ministers*

21 *https://www.unepfi.org/net-zero-alliance/*

22 *https://www.unepfi.org/banking/bankingprinciples/*

23 *https://www.fsb-tcfd.org/tcfd-supporters/*

24 United Nations Inter-agency Task Force on Financing for Development (2019) Financing for Sustainable Development Report 2019. *https://developmentfinance.un.org/fsdr2019*

25 In the 2009 Pittsburgh Leaders Declaration, G20 called for medium-term rationalization and phasing-out of inefficient fossil fuel subsidies that encourage wasteful consumption. Subsequent G20 forums reaffirmed efforts in participating in voluntary peer reviews and increase investments in clean energy.

26 Simple regression slope for the periods 1989-2008 and 2009-2019 respectively.

27 IIF (2019). The Case for Simplifying Sustainable Investment Terminology. *https://www.iif.com/Portals/0/Files/content/Regulatory/IIF%20SFWG%20-%20Growing%20Sustainable%20Finance.pdf*

28 Mackintosh, J. (2019). A User's Guide to the ESG Confusion. *https://www.wsj.com/articles/a-users-guide-to-the-esg-confusion-11573563604*

29 Poh , J. (2019). Conflicting ESG Ratings Are Confusing Sustainable Investors. *https://www.bloomberg.com/news/articles/2019-12-11/conflicting-esg-ratings-are-confusing-sustainable-investors*

30 Calculated as the average of the interest in 2019 over the average of the interest in 2015.

31 Search interest relative to the highest point on the chart for the given region and time. A value of 100 is the peak popularity for the term. A value of 50 means that the term is half as popular. A score of 0 means there was not enough data for this term.

32 G7 (2019). Financing for Development Declaration, Improving measurement, mobilizing resources and realizing the vision of the 2030 Agenda and the SDGs. *http://www.g7.utoronto.ca/dev/2019-financing-for-sustainable-development.pdf*

33 United Nations Inter-agency Task Force on Financing for Development (2019) Financing for Sustainable Development Report 2019. https://developmentfinance.un.org/fsdr2019

34 UNEP Inquiry/World Bank Group (2017). Roadmap for a Sustainable Financial System. *http://unepinquiry.org/publication/roadmap-for-a-sustainable-financial-system/*

35 United Nations Inter-agency Task Force on Financing for Development (2019) Financing for Sustainable Development Report 2019. *https://developmentfinance.un.org/fsdr2019*

36 The layouts found throughout this report were obtained using the Yifan Hu network graph layout algorithm in the software Gephi. The Yifan Hu Multilevel layout algorithm is a force-directed algorithm well-suited for large networks. It was chosen to be able to deal with the large number of nodes in the given network (more than 6,000), while retaining the layout structure of conventional force-directed algorithms.

37 Among the range of partnerships included in this analysis, some focused exclusively on sustainable finance (such as the Principles for Responsible Investment) and some have a broader focus but include sustainable finance as one aspect, subcategory or working group (such as the UN Global Compact).

38 While estimates on the number of total banks worldwide vary from 15,000 to 25,000, the banks considered in this network account for more than one third of global banking sector assets, according to estimates from the 131 banks from 47 countries in five continents holding US$47 trillion in assets that have committed to climate action and sustainability by signing the Principles for Responsible Banking.

39 The 'country' category covers many types of regional governing entities and thus contains a variety of nodes that may not strictly be countries, such as federal governments, local governments, regulatory bodies, ministries or central banks.

40 The number of financial centres here is lower than the number of members in certain partnerships focused on financial centres because some of these members are not strictly financial associations. They are classified accordingly in this table as, for example, associations or 'country' in the case of regulatory authorities.

41 Some of the network constituents involved in many partnerships were also found to be among the top financing/investing institutions on fossil fuels or deforestation (see Indigenous Environmental Network (2019). Banking on Climate: Fossil Fuel Finance Report Card 2019. *https://www.ienearth.org/wp-content/uploads/2019/03/RAN-Report-Card-2019-F03.pdf*).

42 Partnerships considered in this analysis: Network for Greening the Financial System, Finance Minister Coalition for Climate Action, EU Sustainable Finance Platform, Financial Centers for Sustainability, Sustainable Insurance Forum, Sustainable Banking Network.

43 79 additional policy and regulatory measures were identified in 2019.

44 G20 Leaders asked the Financial Stability Board (FSB) to develop a policy framework to address the systemic and moral hazard risks associated with systemically important financial institutions (SIFIs), and initially in particular global SIFIs (G-SIFIs). The G20 endorsed the FSB's SIFI Framework in November 2010.

45 The list of G-SIBs is divided into 'buckets' corresponding to the required level of additional loss absorbency. G-SIBs are a group of 29 large international banks that are required to hold extra equity capital against losses because of their size, complexity and importance to the international financial system.

46 IMF (2019). Global Financial Stability Report: Lower for Longer. *https://www.imf.org/en/Publications/GFSR/Issues/2019/10/01/global-financial-stability-report-october-2019*

47 European Central Bank (2019). Financial Stability Review, November 2019. *https://www.ecb.europa.eu/pub/financial-stability/fsr/html/ecb.fsr201911~facad0251f.en.html*

48 Bank of England (2019). Financial Stability Report and Record - July 2019. *https://www.bankofengland.co.uk/financial-stability-report/2019/july-2019*

49 Svaluto Moreolo, C. (2020). Asset management faces systemic risk questions. *https://www.ipe.com/home/asset-management-faces-systemic-risk-questions/10042991.article*

50 Recognizing that systemic risk may arise not only from the distress or disorderly failure of individual insurers but also from the collective exposures of insurers at a sector-wide level the International Association of Insurance Supervisors (IAIS) published in 2013 a methodology for identifying global systemically important insurers (G-SIIs), and a set of policy measures that will apply to them. The FSB has endorsed the methodology and these policy measures. In light of the progress with the proposed holistic framework, the FSB, in consultation with the IAIS and national authorities, has decided not to engage in an identification of G-SIIs in 2018. The FSB, in consultation with the IAIS and national authorities, has decided to suspend Global Systemically Important Insurers (G-SII) identification as from the beginning of 2020. In November 2022, the FSB will, based on the initial years of implementation of the holistic framework, review the need to either discontinue or re-establish an annual identification of G-SIIs by the FSB in consultation with the IAIS and national authorities

51 Considering the growth in the asset management sector, the trend towards greater market-based intermediation through asset management entities and the need to better understand associated risks the FSB published in 2017 "Policy Recommendations on Asset Management Structural Vulnerabilities" to address actual and potential risks from "structural vulnerabilities" in the asset management sector and with this opening up the possibility to designate funds as being globally systemically important. See FSB (2017). Policy Recommendations to Address Structural Vulnerabilities from Asset Management Activities. *https://www.fsb.org/wp-content/uploads/FSB-Policy-Recommendations-on-Asset-Management-Structural-Vulnerabilities.pdf*

52 Asset managers were ranked by AUM, while asset owners and banks were ranked by total assets. For asset managers, the degree of the parent financial group was considered.

53 Top 20 insurance providers by the amount of premiums underwritten.

54 International partnerships looking to engage with financial market actors have often been criticized on their scope, enforcement, reporting and transparency, and lack of ambition to advance the environmental and human rights agenda.

55 Over 40% of the Earth's biodiversity is located in South America, as well as over a quarter of its forests and six of the world's most biodiverse countries (Brazil, Colombia, Ecuador, Mexico, Peru and Venezuela).

56 While not mapped in this example, we assume that the connections within the members of each cluster are stronger and characterized by a higher density of ties than the connections between clusters. It would follow that, in practice, it rarely happens that a specific tie provides the only path between two points or clusters.

57 Granovetter, M.S. (1973). The Strength of Weak Ties. American Journal of Sociology, Volume 78, Issue 6. *http://snap.stanford.edu/class/cs224w-readings/granovetter73weakties.pdf*

58 Benefits of direct/indirect interactions among network nodes. It refers to the added value that a network environment can generate (in comparison with a set of separate activities or actors).

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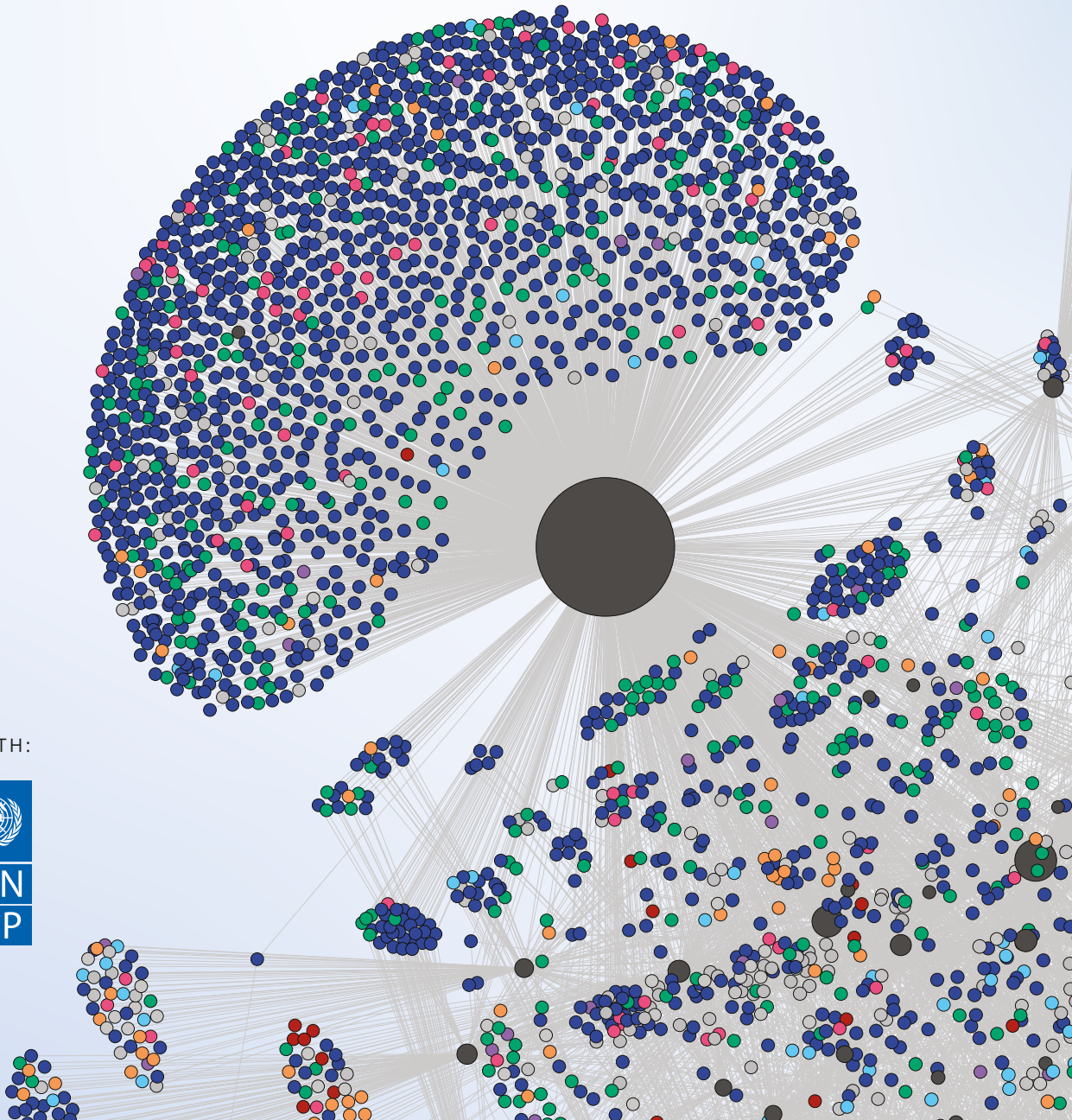

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