SUSTAINABLE RICE LANDSCAPES INITIATIVE

Scaling private sector investment in sustainable rice: Needs and opportunities

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Acronyms

AWD	alternate wetting and drying
ADB	Asian Development Bank
AfDB	African Development Bank
DIB	Development Impact Bonds
DFI	development finance institution
FAO	Food and Agriculture Organization
GEF	Global Environment Facility
GIZ	German International Development Agency (*Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH*)
GHG	greenhouse gas
IFC	International Finance Corporation
IPM	integrated pest management
IRRI	International Rice Research Institute
MFI	microfinance institution
MRL	maximum residue level
NAP	National Adaptation Plan
NAMA	Nationally Appropriate Mitigation Action
NDC	Nationally Determined Contribution
NGO	non-governmental organization
PI	performance indicator
PPP	public-private partnership
R&D	research & development
SME	small and medium-sized enterprises
SPV	special purpose vehicle
SRLI	Sustainable Rice Landscapes Initiative
SRP	Sustainable Rice Platform
TA	technical assistance
UNEP	UN Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WBCSD	World Business Council for Sustainable Development

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Executive summary

Context

Rice is crucial for food security and nutrition globally, and particularly in low and lower middle-income countries.[1] It is the key staple food in Asia and an important staple in Latin America and the Caribbean, and increasingly in West Africa. Rice production is practised on as many as 144 million farms,[2] with the vast majority located in Asia where around 90 percent of the world's rice is produced. The scale of rice production systems and associated management practices, including mono-cropping and multiple cropping, agrochemical use, irrigation, and unsustainable land use, have resulted in pollution and degradation.[3] If more sustainable practices in rice production landscapes are not adopted, these adverse impacts will worsen in line with increasing demand for rice from a growing population.

There are many tested practices and technologies that can create farm- and landscape-level value by increasing the sustainability and productivity of rice farming, such as improved water management and introducing improved rice varieties.[4] However, rice farmers commonly operate within value chains and production landscapes that do not enable them to take advantage of such opportunities. Most rice growers lack access to reliable and affordable inputs, mechanization, irrigation, advisory services, off-takers (i.e. buyers of agricultural products), and finance. The transition to more sustainable rice farming landscapes will involve: targeted agronomic support; access to appropriate inputs; supportive business relationships including customer demand, landscape-level production and supply chain infrastructure; research & development (R&D); complementary financial services; and an enabling policy and regulation environment.

While capital does flow to the rice sector, it has been relatively constrained due to generally low margins, high complexity, and uncertain returns – particularly for primary production and first-stage processing. Additionally, trade flows in rice are predominantly South-South, which is not conducive to mobilizing significant international investment because of associated credit and currency risks. Previous work to identify opportunities to unlock new finance for sustainable rice identified three promising mechanisms to leverage climate finance to attract private sector investment, namely: 1) digital finance platforms; 2) corporate rice bonds; and 3) blended finance instruments.[5]

WBCSD and the SRP, with the support of FAO and the SRLI, developed this report to dive deeper into the opportunities, needs and requirements to leverage private-sector investment in sustainable rice landscapes. The report aims to understand how public and private partnerships can be better used to scale up investment in sustainable rice production systems and landscapes and drive a large-scale transition encompassing actors across the full rice value chain. This report therefore considers value-chain stakeholders, such as input providers, traders and millers, and local financial institutions, such as banks and microfinance institutions (MFIs), as the main entry points.

[1] GRiSP (Global Rice Science Partnership). 2013. Rice almanac, 4th edition. Los Baños (Philippines): International Rice Research Institute. 283 p. https://ageconsearch.umn.edu/record/164484
[2] IRRI, 2010. Rice and the global economy.
[3] Chauhan, B., Mahajan, G. & Jabran, K. 2017. Current Status, Challenges, and Opportunities in Rice Production in Chauhan, B., Jabran, K., & Mahajan, G. (eds) Rice Production Worldwide. Springer. ISBN 978-3-319-47516-5
[4] ESG. 2019. Financing sustainable rice for a secure future: Innovative finance partnerships for climate mitigation and adaptation.
[5] Ibid.

The SRLI partners are already working together to take forward the report's findings:

- A blended finance facility is currently being designed with funding from the Global Environment Facility (GEF) and will be piloted in Bangladesh, Cambodia and Vietnam.

- An accelerator for nature-based rice solutions is being scoped to leverage the rapidly expanding carbon markets to increase private-sector funding for sustainable rice production.

Approach and findings

The report findings are based on a survey of representatives from more than 50 public and private organizations involved in the production, processing, and financing of sustainable agriculture. Additional insights were gathered from the organization of sustainable rice finance roundtables in key rice-production geographies. The findings of these engagements highlighted some consistent themes and recommendations for promoting and financing sustainable rice.

- **Upstream value creation is paramount.** Farmers and service providers in production landscapes need value propositions (e.g. agronomic packages, financial services, and income opportunities) that work in their real-world context.

- **Cash flow is key.** Solutions are needed to address payment delays and profit erosion across long value chains, and to mitigate fluctuations in farmer incomes throughout the year.

- **Trusted business relationships are needed along the value chain.** Trusted relationships amongst value-chain actors are essential for reducing side-selling in the context of pre-financing and off-take agreements.[6]

- **Capacity of essential enablers needs strengthening.** To bring effective, bankable counterparties to finance sustainable rice, strong local capacity amongst essential enablers (e.g. cooperatives; agricultural small and medium-sized enterprises (agri-SMEs); off-takers) in rice production landscapes is required over the long term.

- **Money alone will not overcome the challenges.** Technical assistance and service provision need to be embedded within financial structures.

- **Size mismatch inhibits finance.** De-risking and finance mechanisms need to be adapted to relatively small funding needs at the farmer level (e.g. aggregating similar projects to support larger investments).

- **There are no off-the-shelf blended finance projects.** Value propositions need to be co-created based on pre-investment feasibility assessments.

These perspectives suggest that transitioning to sustainable rice production will require a mix of funding sources and instruments, the most catalytic likely being long-term patient capital for context-specific uses via high-quality local counterparties and implementing partners,[7] and de-risking by using concessionary funders (i.e. funders who provide capital on terms lower than the commercial market rate) and through technical assistance. Finance models that can successfully scale up private sector investment in sustainable rice will require strong partnerships involving a range of actors, public and private, with different appetites for risk and return. Partnerships, and public-sector engagement in particular, will also be crucial for

[6] Side-selling occurs when a producer breaks a commitment to sell to a particular off-taker and instead sells to another buyer.
[7] Patient capital providers are those who are willing to invest for the long term (more than five years), have a higher risk tolerance, and, in some cases, are willing to accept lower financial returns in exchange for positive social and/or environmental impact.

effecting change across production landscapes and in the majority of those rice value chains that are not connected to internationally traded or domestic premium markets.

Financing instruments

Based on these findings, several forms of patient capital suitable for leveraging private-sector investment in sustainable rice were identified with relevance for certain geographies, including loan intermediation, credit guarantees and special purpose vehicles (SPVs).

- **Loan intermediation.** To support sustainability transitions in identified rice value chains or production landscapes, an existing local or regional financial institution (e.g. commercial or development bank; microfinance institution) increases lending to rice growers and agri-SMEs based on access to new dedicated credit facilities from development finance institutions (DFIs), donors, and/or commercial investors. Opportunities were identified in Sub-Saharan Africa, and South and South-East Asia.

- **Credit guarantee.** Guarantees provided (or subsidized) by concessionary capital enable an existing local or regional financial institution to fund a new or existing portfolio of sustainable rice activities (e.g. producer support; input financing) with this potentially being supported by companies engaged in rice value chains and production landscapes. Opportunities were identified in South and South-East Asia.

- **Special purpose vehicle (SPV).** A blended finance SPV (e.g. investment fund; company) mobilizes commercial capital toward sustainable rice activities (e.g. working capital paired with pre-harvest and off-take support) combined with concessionary capital (e.g. technical assistance grants). Opportunities were identified in Brazil and South Asia. However, scaling challenges may make these a lower priority.

The consultations undertaken to inform this report also reinforced earlier findings that combining elements of these instruments in a blended finance approach will likely be required to address the challenges to scaling private finance for sustainable rice. In this report, we define **blended finance** as "the use of catalytic capital from public or philanthropic sources to increase private sector investment in sustainable development."[8] It involves combining multiple finance sources (e.g. commercial; large multilateral funder) and approaches (e.g. credit lines; loan guarantees; selected direct investments; technical assistance) into one larger facility or funding programme.

Key design questions for adapting finance mechanisms to specific rice landscapes relate to funding (e.g. type of needs; size of potential portfolio), impact (e.g. type; magnitude; beneficiaries; sustainability verification), and potential for replication and scale. Successful additional capital mobilization depends on locally validated technical knowledge and high-capacity (typically local) service providers with viable business models. Motivated, flexible, knowledgeable partners including input providers, off-takers, consumer-facing brands, and financiers should be aligned with business and impact outcomes. The next steps towards a viable sustainable rice finance programme that will leverage investment from the private sector will include pre-feasibility assessments to identify possible projects, defining specific strategies and lead counterparties and designing a suitable financing structure.

[8] See https://www.convergence.finance/blended-finance; for further discussion, see Havemann et al. 2020.

Way forward

To further address the needs and opportunities identified in this study, the following actions are proposed:

1. Engage with potential transaction counterparties in South Asia (Pakistan and India), South-East Asia (Vietnam, Thailand, and potentially Cambodia, Indonesia, and the Philippines), and Sub-Saharan Africa to better understand their funding needs and challenges with respect to rice landscapes and identify potential specific transactions at the local or regional level.

Implementing change will only be possible if organizations exist that can take long-term responsibility for, and have a strategic business interest in, sustainable rice landscapes. Financiers require transaction counterparties that have appropriate expertise and size, and that can be held legally accountable. To move forward, key private-sector entities operating in, or with the potential to operate in, rice production landscapes, such as farmers' organizations, input providers, millers, trader and buyers (brands), must be identified, and work must be undertaken to better understand their financing needs and challenges, as well as their bankability.

2. Assess the potential for a global or multi-regional rice-focused funding facility that would provide the base for sufficient capital mobilization in emerging markets and combine a variety of funding instruments (e.g. loans; technical assistance; grants or other concessionary funding).

Scale is important in mobilizing additional funds from key donors and from the capital markets (private finance). However, while capital must be mobilized at scale it must be deployable across the range of sizes and types of counterparts that can enact change. Realizing the opportunities identified in this report requires engagement with key public and private funders to understand minimum size thresholds, preferred financing instruments and other characteristics that would increase the likelihood of sufficient capital mobilization. Potential transaction counterparties and intermediaries also need to be engaged at an early stage to understand their priority funding needs, in terms of instruments, timeframe, cost and other conditions.

3. Investigate the potential for rice landscapes to support emissions reductions under Article 6 of the United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement, aligned with country-led initiatives for climate change mitigation and adaptation, including Nationally Determined Contributions (NDCs).

Rice production is a major staple but also a source of greenhouse gases (GHGs) and is an important sector in several countries' NDCs and National Adaptation Plans (NAPs). Emerging and developing markets will require additional funding to meet their rice-related climate priorities. This may also be an opportunity for mobilizing multilateral, bilateral and private climate finance. Further work is required to assess the current and expected future inclusion of rice landscapes in NDCs. Also, additional analysis is required to understand the strategies and governance frameworks required of developing and emerging markets for attracting additional funding (private and public) for NDCs through Article 6 of the Paris Agreement, the use of jurisdictional approaches, and nesting of voluntary carbon market transactions. As part of this analysis, rice finance project developers and finance providers will need to assess the feasibility of compliance and voluntary GHG offsets in their transactions.

1. Introduction

Rice in context: Rice is crucial for food security and nutrition globally, and particularly in low and lower middle-income countries.[9] Rice supplies one-fifth of the world's dietary energy.[10] A total of 90 percent of global rice production is in Asia, where it is a staple food for 3.5 billion people. Rice is also a staple food in Latin America, the Caribbean, and West Africa. A projected net increase of 25 percent in global rice demand over the next 25 years,[11] paired with downward pressure on productivity, is likely to shrink global rice surpluses.[12]

Rice production is practised on as many as 144 million farms,[13] and is central to the livelihoods of 150 million smallholder farmers. These farmers normally have limited access to inputs and services and sell their rice to local traders or rice mills as price takers, meaning they have limited bargaining power and must take the price they are offered. While a small proportion of global rice production occurs on modernized farms in structured supply chains, the vast majority is grown in fragmented, low-productivity value chains. Small and medium-sized enterprises (SMEs) play key roles in rice value chains, but often have underdeveloped technical, marketing, and financial capabilities.

Need for a transition to sustainable rice: While essential to food security and agricultural livelihoods, rice production landscapes have a large environmental impact, especially for GHGs (emitting 10% of global methane), water (consuming 40% of global irrigation water), agri-chemicals (using 13% of all fertilizers) and land use (covering 15% of all natural wetlands).[14] At the same time, rice production landscapes are vulnerable to climate change (which may lower yields by 15% by 2050), water scarcity, upstream land degradation, soil salinization (from sea level rise), and pest and disease pressures.[15]

Rice sector companies, governments, and global donors are beginning to recognize the need for a transition to sustainable rice value chains to ensure continuity of supply, to improve rice quality, to strengthen rural livelihoods, and to shore up food security. This recognition is partly reflected in both the growing number of commitments for sustainable sourcing by consumer-facing agricultural companies and the number of countries that have made sustainable rice production a priority in national agricultural and climate policies including the NDCs under the Paris Agreement.[16] Global insurers also face material risk from agricultural production shocks affecting rice and other staple cereals.[17]

Tested practices and technologies are available to create farm- and landscape-level value by increasing the sustainability and productivity of rice farming, e.g. by improving water management or introducing improved rice varieties. However, rice farmers commonly operate within value chains and production landscapes that do not enable them to take advantage of such opportunities. Smallholder rice production within fragmented value chains has also not received the same level of global attention as commodities such as soy and palm oil, nor attracted significant

[9] Rice Almanac 4th Edition. 2013.
[10] https://ricepedia.org/rice-as-food/the-global-staple-rice-consumers
[11] SRLI and GEF-7: Catalysing transformational shifts in food systems through Sustainable Rice Landscapes.
[12] Positioning the Sustainable Rice Platform to transform the global rice sector. SRP Visioning Workshop, 8-9 May 2018.
[13] IRRI, 2010. Rice and the global economy.
[14] Earth Security Group. 2019. Financing sustainable rice for a secure future: Innovative finance partnerships for climate mitigation and adaptation.
[15] Climate change. Ricepedia. http://ricepedia.org/challenges/climate-change
[16] Climate-smart rice is referenced in 48 countries' Nationally Determined Contributions, including Bangladesh, China, Myanmar and Vietnam; Bangladesh has set rice emission reduction targets (ESG, 2019).
[17] Lunt et al., 2016.

financial investment despite growing global demand. Most rice growers lack access to reliable and affordable inputs, mechanization, irrigation, advisory services, off-takers (i.e. buyers of agricultural products), and financial services, including credit and insurance. The transition to more sustainable rice farming landscapes will involve targeted agronomic support, access to appropriate inputs, supportive business relationships including customer demand, landscape-level production and supply chain infrastructure, R&D, complementary financial services, etc.

Assessing funding needs and opportunities: While capital does flow to the rice sector, it has been relatively constrained due to generally low margins, high complexity, and uncertain returns – particularly for primary production and first-stage processing. Additionally, trade flows in rice are predominantly South-South, which is not conducive to mobilizing significant international investment because of associated credit and currency risks. Previous work to identify opportunities to unlock new finance for sustainable rice identified three promising mechanisms to leverage climate finance to attract private sector investment, namely: 1) digital finance platforms; 2) corporate rice bonds and 3) blended finance instruments.[18]

This report was developed to dive deeper into the opportunities, needs and requirements for blended finance to leverage private-sector investment in sustainable rice landscapes.

The report aims to assess opportunities and needs for finance across rice value chains and landscapes (i.e. not a commodity-based approach) and emphasizes the opportunities to leverage investment from private sources by facilitating contributions from both public and private-sector organizations. The study methods included the following:

- Synthesis of experience to date with sustainable rice finance through a targeted desk review, emphasizing funding gaps and investment opportunities.
- Interviews with representatives from more than 50 organizations engaged in the rice sector spanning government and the private sector including potential investment intermediaries to characterize different interests and finance opportunities across the rice sector.
- Validation of the study findings and recommendations through the organization of five regional roundtables (see summaries in appendices).

The aim of the organizations engaged in this work is to channel more finance to smallholder rice farmers and related agricultural communities to adopt the practices and technologies needed for a transition to sustainable rice. As this report is centred on rice landscapes, it focuses on two main finance-related entry points, the value chain and local financial institutions, with an emphasis on the former. The value chain refers to businesses that are involved in providing goods and services related to the business of rice production, transformation and sales. While the report also considers local banks and MFIs as an important entry point to reach farmers in rice landscapes, it does not delve into broader financial inclusion challenges faced by rice-growing communities. The approach adopted in this report aims to understand how public and private partnerships can be better used to scale up investment in sustainable rice production systems and landscapes and drive a large-scale transition encompassing actors across the full rice value chain. The financial mechanisms highlighted in this report will need to be combined with technical assistance, grants and philanthropic finance as well as emerging approaches related to impact financing and carbon finance such as jurisdictional approaches documented in other literature.

[18] ESG. 2019. Financing sustainable rice for a secure future: Innovative finance partnerships for climate mitigation and adaptation.

The factors affecting rice production are particularly relevant for the sector in Asia, given the size of its role in that region. But rice is also an important globally, and the stakeholder interviews and consultations for this report correspondingly included organizations with interests in the rice sector at a global scale. As a result, the report considers opportunities and needs for scaling-up investment in sustainable rice across the world.

After introducing the general context and experience to date in promoting sustainable rice production (sections 1 and 2), the report presents the findings from interviews with stakeholders on the opportunities, challenges, and necessary approaches (section 3). Section 4 summarizes major needs going forward and recommends three general finance structures suitable to rice value chains. Section 5 surveys opportunities in specific geographic regions, and section 6 outlines major steps for designing finance structures for sustainable rice projects. Section 7 proposes ways to build on the findings of this report.

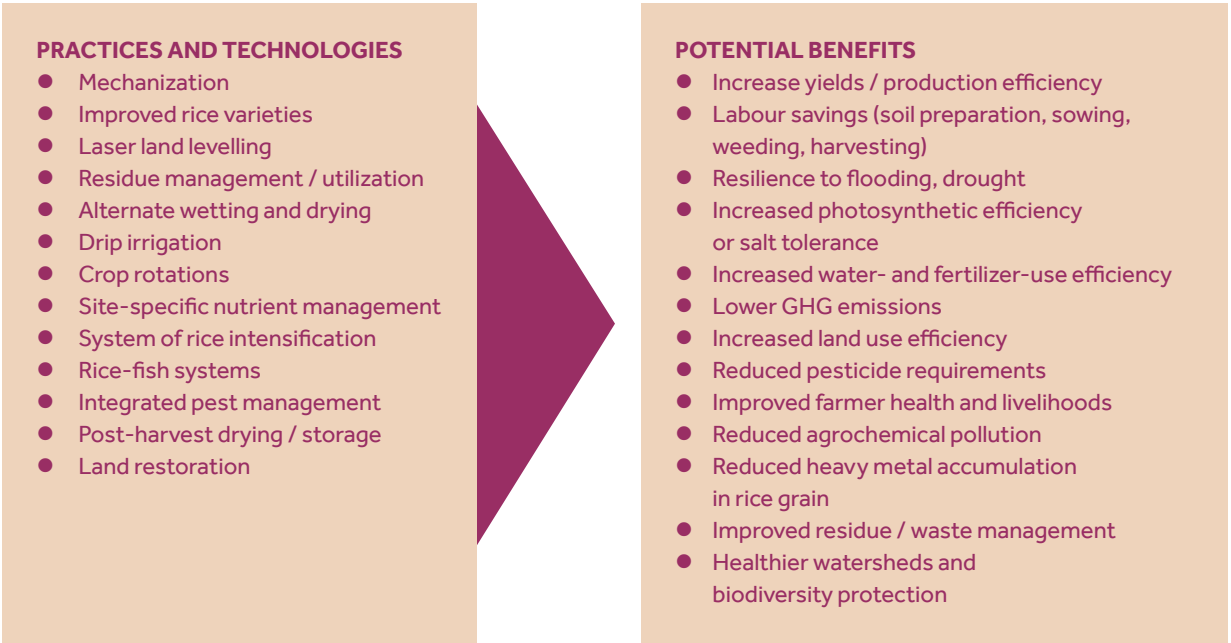
2. Strategies for sustainable rice finance

Strategies for enabling a transition to sustainable rice

Enabling a transition to sustainable rice value chains and landscapes will require the adoption of practices and technologies that can lower GHG emissions, increase water use efficiency, reduce environmental impacts, and increase resilience and profitability (see Figure 1). Such practices and technologies have already been tested in major rice-growing regions.[19]

Rates of adoption of these practices and technologies have been low due to market failures in delivering high-quality, affordable inputs (e.g. seeds, fertilizers) and services (e.g. irrigation, machinery) and developing reliable markets (including storage and transport infrastructure and price transparency) and financing mechanisms. These constraints are compounded by smallholders' low level of assets, weak financial inclusion, and limited land tenure security. These are particularly acute for women farmers.[20] Facilitating wider adoption requires the use of a mix of strategies that will often be specific to the rice value chain and production landscape. Table 1 summarizes different groups of strategies for increasing the use of sustainable rice practices and technologies.

Figure 1 Potential benefits of major rice sustainability practices and technologies



[19] For example, in the Mekong River Delta (Stuart et al. 2018), in Myanmar (Win et al. 2020), in Odisha, India (Devkota et al. 2020), in Nigeria (Tobias et al., 2020), in Africa (Malabo Montpellier Panel, 2018).
[20] Piñeiro et al., 2020

Table 1 Potential strategies to increase use of sustainable rice practices and technologies

	STRATEGIES
R&D	• Develop or adapt practices / technologies to prevailing rice production systems. • Quantify sustainability outcomes (yield, profitability, GHG emission, water, etc.)
Agronomic support	• Provide farmer training and diagnostic (e.g. soil tests) and advisory (e.g. IPM) services.
Inputs and services	• Develop capacity for last-mile delivery of input supply and service provision,[21] including production or importation of high-quality inputs and equipment, and provision of flexible machinery-ownership models.
Off-take infrastructure	• Establish storage, transport, and processing (milling, packaging) facilities. • Increase farm-gate prices (e.g. via disintermediation, digitization).
Market building	• Build consumer demand for sustainably produced rice in domestic and international markets. • Establish value chains for locally preferred rice varieties. • Develop complementary revenue streams from waste related to the rice sector. • Assess and support market interest in (and willingness to pay for) environmental benefits associated with sustainable rice production (e.g. methane reduction).
Finance mechanisms	• Provide farm credit at reasonable rates and on appropriate repayment schedules (e.g. backed by off-take guarantees and evidence of farm-level resilience; informed by credit history). • De-risk rice value chains (e.g. farm insurance, grant-funded TA, subsidized loans to agri-SMEs, credit guarantees to agricultural lenders, surety bonds). • Take equity positions in rice value chain companies providing sustainability innovation.

Greenhouse gas mitigation in the rice sector

Paddy rice represents an important opportunity for reducing GHG emissions in crop agriculture. Rice fields emit methane and nitrous oxide when inappropriate water, soil, input, and plant management techniques are applied.[22] Burning of rice straw emits carbon dioxide and contributes to black carbon emissions. On the other hand, incorporating the straw back into the soil instead can increase methane release, depending on the drainage method.[23] Fertilizer and water use in rice production involve significant embedded energy and GHG emission.[24] Additional GHG emissions are associated with post-harvest activities due to energy use (e.g. drying; milling; packaging; transporting) and product loss (e.g. inadequate storage facilities).

[21] Such as resilient rice varieties, tailored fertilizer blends, irrigation, laser land leveling, ploughing, ridging, harvesting, threshing, winnowing, etc.

[22] Compared to carbon dioxide, methane is a short-lived greenhouse gas with a Global Warming Potential (GWP) of 28 over 100 years, while nitrous oxide is a long-lived GHG, with a GWP of 265 over 100 years (Myhre et al., 2013). See also Islam et al., 2020 and https://www.pbs.org/newshour/science/agriculture-emits-a-forgotten-greenhouse-gas-scientists-are-looking-for-solutions-in-the-soil.

[23] Islam et al., 2018. The recommended management for rice straw is to incorporate it early and leave for a long period (6 months or more) in the soil before the next rice crop or to remove the straw from the field for other uses. Uncontrolled decomposition of rice husks can also generate additional methane emissions. Rice straw and husks can be used for soil amendments (e.g. rice husk for biochar and rice straw/husk for compost or mushroom production) (Ghorbani et al., 2019).

[24] Rice is estimated to require one-seventh of fertilizers globally, and one-third of irrigation water, both of which represent significant embedded energy use and GHG emission (i.e., production of fertilizers, pumping of water). For example, production of ammonia fertilizer accounts for about 1% of all global energy use. https://www.pbs.org/newshour/science/agriculture-emits-a-forgotten-greenhouse-gas-scientists-are-looking-for-solutions-in-the-soil

Backed by extensive research, multiple management strategies are available to reduce GHG emissions in rice production,[25] although rice production practices must be tailored to local conditions to ensure beneficial results.[26] Careful control of the timing, duration, and extent of rice field flooding, and of the accompanying fertilization and soil amendment regimes, can significantly reduce GHG emissions, especially when paired with laser levelling.[27,28] Shifting to short-duration, high-yielding varieties is an effective method for reducing emissions per unit of rice.[29] Further mitigation can be achieved through proper rice waste management,[30] use of renewable energy (e.g. for water pumping), and optimized post-harvest handling.

Given high baseline emissions (e.g. 11% of global anthropogenic methane emissions[31]) and available mitigation practices and technologies, rice mitigation measures feature prominently as part of the emissions reductions strategies outlined in many countries' NDCs under the Paris Agreement.[32] In addition, the availability of international accreditation protocols has generated strong interest in financing rice-based GHG mitigation through carbon offset credits.[33] However, predictive capacity for financial returns using this strategy is underdeveloped and implementation of rice carbon-credit projects are yet to be realized at scale in smallholder contexts, where the majority of rice is grown.[34]

To achieve necessary scale for carbon finance in smallholder-dominated rice production landscapes and to enable effective governmental support, jurisdictional approaches are likely to be important.[35] Individual projects could be embedded within jurisdictional approaches if these were to be developed for agriculture as they have been for other sectors.[36,37] Several rice-focused mitigation projects are emerging, notably a recently registered Indian UNFCCC programme-of-activities carbon credit project,[38] and a Chinese project in Tongcheng City using the same methodology as is used under the Verra voluntary carbon standard. A carbon credit project using the Gold Standard certification is also in development in Chachangsao, Thailand, supported by Swiss retailer Migros.[39]

[25] A transition on one hectare of traditional smallholder farming to low-emission rice practices can reduce emissions equivalent to removing 1.3 passenger vehicles from the road for a year (based on conservative estimate of 3tCO_2e/ha/season reduction in a double-cropping system compared to average passenger vehicle emission of 4.6tCO_2e/year https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle#:~:text=typical%20passenger%20vehicle%3F-,A%20typical%20passenger%20vehicle%20emits%20about%204.6%20metric%20tons%20of,8%2C887%20grams%20of%20CO2)

[26] Yagi et. al., 2020.

[27] Laser levelling of rice fields ensuring precise and even water depth in the field, enhancing the efficacy of AWD.

[28] For example, shifting to shallow flooding (mild intermittent flooding, or AWD) with tailored co-management of nitrogen and organic matter. Careful management is essential as NO_2 emissions are expected to decrease under shallow (mild-intermittent) flooding, but increase under intensified use of intermittent flooding. High-intensity sampling may be necessary to establish protocols that appropriately balance nitrous oxide and methane emissions (Kritee et al. 2018).

[29] Direct seeding techniques can also reduce methane emissions (Kumar & Ladha, 2011).

[30] Rizal et al., 2020.

[31] IPCC, 2013.

[32] ESG. 2019. Financing sustainable rice for a secure future: Innovative finance partnerships for climate mitigation and adaptation.

[33] A methodology has been approved under the UNFCCC Clean Development Mechanism (CDM), which focuses exclusively on reducing methane and is small-scale (AMS-III.AU. 2021). This methodology could be used to generate voluntary offset credits under the Gold Standard and Verra (VCS), in addition to other accredited carbon registry programmes (https://globalgoals.goldstandard.org/406-luf-agr-cdm-iiiau-emission-reduction-water-management-practice-in-rice-cultivation/).

[34] Complex and costly third-party validation / verification systems and chain-of-custody regulations likely hinder financial investment.

[35] https://www.wri.org/insights/insider-4-reasons-why-jurisdictional-approach-redd-crediting-superior-project-based

[36] Irawan et al., 2019; World Bank, 2018; https://verra.org/project/jurisdictional-and-nested-redd-framework/

[37] Notably forestry (von Essen & Lambin, 2021).

[38] https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/85WQD6VRF0LM1UIBENGO3PA27KSTHX/view

[39] https://www.myclimate.org/information/carbon-offset-projects/detail-carbon-offset-projects/pdf/?tx_mcop_projectdetails%5Bproject%5D=89&tx_web2pdf_pi1%5Baction%5D=&tx_web2pdf_pi1%5Bargument%5D=printPage&tx_web2pdf_pi1%5Bcontroller%5D=Pdf&cHash=99c82fcfd6c6320a59c30ccbac296c12

Over time, other opportunities to monetize carbon in specific markets may emerge. The American Carbon Registry has implemented a carbon credit methodology, although there are anecdotal concerns regarding its development and verification costs.[40] The Australian voluntary Carbon Farming Initiative is operational but does not include rice-based mitigation.[41] Although rice farming is a significant source of GHGs in Italy, and likely also in Spain,[42] primary agriculture is not covered under the European Emissions Trading Scheme (EU ETS) and the emerging European Carbon Farming Initiative does not explicitly refer to rice.[43,44,45]

Experience to date in sustainable rice finance

While scaling finance is only one possible strategy to drive the transition to sustainable rice, the availability of finance enables other strategies; therefore the lack of finance is often highlighted as the key constraint. The scale of the specific finance needs and opportunities for a transition to sustainable rice have not been quantified. Some insight on the potential could be gained by reflecting on broad measures of recent public and private finance and investment flows in agriculture. For example, foreign direct investment and donor financial flows to agriculture were USD 4.7 billion and USD 17 billion, respectively, in 2019.[46,47] Formal agricultural credit in nominal terms was USD 1.14 trillion in 2020.[48] Meanwhile, total government expenditure on the different agriculture sectors was estimated at USD 682 billion in 2020.[49] As a key crop globally, rice accounted for around 7 percent of agricultural output by value in 2019, and for around 10 percent of output in the top 10 rice-producing countries.[50]

To date, efforts to scale up finance for sustainable rice projects, drawing together different sources, have been constrained by a number of factors.

- Smallholder rice growers need multiple sources of support (e.g. access to inputs and services; secure land tenure; technical advising; market linkages; financial inclusion) to strengthen their position and participation within rice value chains.
- In many rice production landscapes and upstream value chains, local capacity (e.g. cooperatives; agri-SMEs; off-takers) needs to be cultivated so that sustainable rice finance projects have effective implementers and bankable counterparties.

[40] https://winrock.org/u-s-farmers-earn-first-carbon-credits-from-rice-production-using-winrocks-american-carbon-registry-rice-protocol/
[41] https://www.agriculture.gov.au/water/policy/carbon-farming-initiative and http://www.fao.org/3/i3084e/i3084e26.pdf
[42] Leip & Bocchi, 2007; Martínez-Eixarch et al., 2021; https://www.ebrofoods.es/en/news/innovative-study-on-methane-emissions-from-spanish-paddy-fields-17-09/
[43] https://ec.europa.eu/clima/policies/ets_en
[44] https://ec.europa.eu/clima/news/commission-sets-carbon-farming-initiative-motion_en
[45] https://ec.europa.eu/clima/policies/forests/carbon-farming_en
[46] FAO. 2022. Foreign Direct Investment Flows to Agriculture 2010–2019. FAOSTAT Analytical Brief Series No 34. Rome.
[47] FAO. 2021. Development flows to agriculture 2002–2019. Global and regional trends. FAOSTAT Analytical Brief Series No. 30. Rome.
[48] FAO. 2022. Credit to agriculture. Global and regional trends 2012–2020. FAOSTAT Analytical Brief Series No. 38. Rome
[49] FAO. 2022. Government expenditures in agriculture 2001–2020. Global and regional trends. FAOSTAT Analytical Briefs Series No. 35. Rome.
[50] FAOSTAT. 2022.

- Fragmented rice value chains are cash-starved (e.g. long payment delays), but also limited in their absorptive capacity for sustainability-promoting finance (e.g. very small farm-level funding needs; high risk of side-selling; currency issues; limited demand for infrastructure investment).

- De-risking strategies (e.g. guarantees by governments or global donors) need to be paired with strong upstream value propositions that deliver increased productivity and profitability.

Structures that have been implemented or proposed for sustainable rice finance emphasize increasing working capital to value-chain actors who can provide training, inputs, and pre-financing to rice growers, in the context of off-take commitments. Global development financiers, such as the World Bank Group, have also provided concessionary loans to emerging market governments for longer-term investments (e.g. irrigation infrastructure targeted at improving rice productivity). Other elements include de-risking (e.g. guarantees by governments or global donors), technical assistance, and potential revenues from sale of carbon offset credits.[51] Table 2 provides examples of existing and proposed approaches. The next section outlines perspectives from stakeholders involved in the rice sector globally on how to best address these challenges and best finance the transition to sustainable rice.

[51] Given the global significance of rice-related GHG emissions (especially methane and nitrous oxide), sustainable rice systems that measurably reduce GHG emissions could potentially generate additional revenue through sale of offset credits or other performance-based mechanisms, but this will require further real-world experience with GHG monitoring at scale in rice production systems.

Table 2 Finance structures for sustainable rice, implemented or proposed for implementation

	DESCRIPTION
Implemented structures	• **Donor-supported TA within a corporate value chain:** Funding by bilateral finance institutions / MFIs for technical support (including digitization, business training, banking access) by in-region research institution toward SRP compliance within a corporate rice value chain. • **Working capital within a corporate value chain:** To increase the quality, reliability, and/or volume of sustainably produced rice (e.g. SRP-compliant), a corporate off-taker guarantees a crop purchase price and provides working capital that can be used to finance farmer engagement, training, input distribution, personal protective equipment, mechanization services, audits, and other aspects of sustainability implementation and verification. Implementing partners include local banks, agri-dealers, retailers, exporters, third-party insurers, local public companies (agri-SME service providers), and research institutes. • **Corporate support platforms:** Privately financed platforms providing farmers access to inputs, agricultural services (mechanization, advisory, digitization), and financial services (insurance). • **Concessionary funding from DFIs to emerging market governments for longer-term investments:** Grants and loans provided by an international development bank to a national government for rice value chain development including: development and rehabilitation of production infrastructure and irrigation systems; machinery and/or other equipment; improved seed varieties; a seed-testing laboratory; fertilizer demonstrations; storage and processing facilities, private sector-led contract farming arrangements with smallholders; and capacity development of farmer organizations.

Structures proposed but not yet implemented[52]	• **Sovereign green bond supported by multilateral climate finance:** Multilateral climate funds support national governments in preparing for the planning, design, and issuance of a sovereign green bond for climate-smart rice investments that links to the targets under NDCs, NAPs for agriculture or National Agricultural Investment Plans. Use of bond proceeds to include nature- and landscape-based solutions for sustainable smallholder rice production (with possible revenue from carbon offsets).
	• **Blended finance for rice value chain development:** Catalytic funding from multilateral, regional and national development banks, as well as national governments, and global donors to develop national and regional sustainable rice value chains (e.g. production and post-harvest infrastructure, better-quality seeds and fertilizers) through private-public partnerships. Central elements to include boosting rice productivity and production (e.g. for import substitution and improved livelihoods) and reducing GHG emissions.
	• Thematic bond issued by a corporation or international agency: A rice bond to be issued by:
	  ◦ international rice processor, trader, or retailer that has off-take agreements with sustainable rice farmers within an integrated value chain; use of proceeds to include farmer pre-financing; or
	  ◦ World Food Programme for procurement of sustainable rice for humanitarian aid, international donors to provide guarantees and cover additional costs of purchasing sustainable rice.
	• **Subsidized farmer capacity building:** Increase the capacity of farmers and farmer organizations in a rice-producing region through agri-entrepreneurship programmes operated by an international financial institution.

[52] Earth Security Group. 2019. Financing sustainable rice for a secure future: Innovative finance partnerships for climate mitigation and adaptation.

3. Stakeholders' perspectives on scaling finance for sustainable rice

To better understand the opportunities, challenges, and needs facing the scaling of finance for sustainable rice value chains and landscapes, representatives from organizations engaged in the rice sector were interviewed, spanning government and private sector including potential investment intermediaries. An overview of the organizations consulted is provided as Appendix B.

What are the opportunities?

Sustainable rice is possible. Stakeholders indicated that changes in rice production strategies can mitigate large GHG and water footprints (e.g. through waste reduction, water management) and increase resilience to climate change (e.g. saline-tolerant varieties), but recognize obstacles to new practices and technologies. In smallholder rice systems, micro-mechanization (given tightening labour supply) and in-village storage (e.g. pre-fabricated steel silos with concrete base and solar fan) may have solid potential. There are opportunities for rice growers to access higher price markets (e.g. Europe; the United States) and to benefit from complementary uses (e.g. consumer products made with rice straw; energy generation), but these require market and capacity development (e.g. methane biodigesters are difficult to optimize).

Upstream value creation is paramount. Stakeholders noted that the pathway to sustainable rice lies in production landscapes more than in processing.[53] Providing smallholder farmers with appropriate agronomic packages and associated finance is a central need.[54] Distribution of farm inputs differs by market (e.g. tiers; direct; national distributors) and payment varies by input type (seeds – cash; crop protection – credit; fertilizer - cash or credit). Sub-par or fake input products can comprise 10-15 percent of the market (e.g. India; Vietnam; Indonesia) as these often provide agro-dealers with higher margins than branded products. In-village storage offers promise for reducing waste. In some cases, rice production is not the most suitable endeavour for smallholder farmers (e.g. compared to horticulture).

Cash flow is key. Improving cash flow is key as smallholder farmers often experience long payment delays, as well as profit erosion from long chains of middlemen, which inhibit capacity to purchase improved inputs or access mechanization services.[55] Smallholder rice farmers are often underbanked (i.e. low

[53] Several individuals discouraged focusing finance initiatives on mills as it is not clear how to embed sustainability through this approach, and also there are not many companies with a lot of mills.
[54] Farm-level performance (i.e. environmental; financial) should be established as a key performance indicator for TA providers.
[55] For example: Karlen & Christiaensen, 2019.

access to finance beyond middlemen; lack of credit history). Furthermore, logistical and regulatory barriers create friction for finance provision, especially where there is a lack of effective local partners.

What are the challenges?

The challenge is complex. The rice industry is highly fragmented, with approximately 90 percent of the world's rice grown by smallholders, who are very weakly connected to markets. Smallholder rice farmers are often the poorest of the poor with extreme vulnerability to market dynamics, weather, and unexpected life events. Without collateralizable assets or guaranteed income, smallholder farmers cannot easily absorb the costs and risks of adopting new practices and technologies.[56] Furthermore, their general distrust of official channels constrains effective engagement.

Money alone will not overcome the challenge. Stakeholders commented that transformation of rice landscapes requires harnessing finance to an essential set of local capacities and incentives. Local political dynamics, land tenure, subsidies, and other structural incentives will heavily influence the potential for sustainable rice landscapes and value chains. Due-diligence challenges, especially in very low-income countries, requires an expensive capacity development process that addresses endemic challenges, cultivates projects, and builds up viable, bankable companies. With the vast majority of rice consumed domestically, local institutions may be wary of international investors who are unwilling to take risks on the local currency and insist on prices in e.g. US dollars.

Size mismatch inhibits finance. De-risking is essential to financing upstream sustainable rice projects given relatively low margins and very high risks in rice. However, working capital requirements in rice supply chains are small relative to the deal size requirements and timeframes of development-oriented funders such as DFIs, impact funds, and international banks. In addition, local banks often lack motivation to develop innovative finance products in agriculture unless there is guidance from the government (e.g. Thailand; possibly Bangladesh). Noting the challenges of direct investment in rice support and limits in companies' ability to scale sustainability initiatives, stakeholders suggested that risk pooling could be useful (e.g. a multi-country investment pool with broad currency exposure, backed by a DFI).

Pre-finance and off-take models need to evolve. Efforts to pre-finance or provide inputs to smallholder rice growers, in the context of guaranteed price off-take contracts, have encountered significant side-selling in situations when spot market prices have been high at harvest time or buyers offer cash at the farm gate. When off-takers offer a forward payment system to growers, side-selling risk may have negative implications for the balance sheet. The logistical and political costs of recovering funds from smallholders are too high and, even if the loss is eventually covered by another party (e.g. insurance; guarantor), compensation can have very long lag times.[57] When projects are pre-financed through agro-dealers, notably more informal ones, exploitive practices can emerge. Mills often need short-term working capital to avoid being pre-empted by local traders snapping up high-value rice. One option is for off-takers to offer rapid payment terms to processors, contingent on accelerated payment to farmers.

Sustainability will rely on demand development. The motivation for off-takers to make upstream investments in sustainable rice may be greater if they need to source specific types or qualities of rice

[56] Mechanization and irrigation can be difficult to finance on a traditional basis as machinery and irrigation equipment are moveable assets that do not function effectively as collateral for relatively informal agri-SMEs (e.g. little to no credit history).

[57] Other barriers can include extremely high interest rates, dysfunction and/or corruption, or unanticipated regulatory obstacles (e.g. in Cambodia, mills are prohibited from offering credit or loans for interest, as this is considered a banking service and reserved for licensed financial service providers).

or if these investments can support brand communications. Stakeholders noted that sustainability certification, at this point, is unlikely to secure a premium price. Demand development can focus on building consumer interest in sustainability labeling as well as market analysis of preferred rice varieties within target markets.

Other incentives will be needed to drive change in domestic markets. Off-taker initiatives will relate primarily to the 8-9 percent of rice that is internationally traded, and may be influenced by the ability to credibly quantify sustainability impacts (e.g. GHGs; water; farm profitability). For the vast majority of rice, which is produced, traded, and consumed domestically, alternative incentive mechanisms will be needed including access to extension, technical assistance, and grant and concessionary finance.

What approaches are needed?

Local capacity is essential. High-functioning local organizations (e.g. cooperatives; agro-dealers; non-governmental organizations (NGOs)) have proven to be important in pilot projects for sustainable rice with smallholder rice farmers and agri-SMEs (i.e. focused on training, agronomy, chemical safety, financial literacy). This includes technical assistance providers, which can vary widely in their ability to deliver effective train-the-trainer programmes. The usefulness of digital solutions is just now being tested (e.g. FarmForce an extension worker app in India) with the expectation that benefits (e.g. disintermediation; using satellites to monitor standing water[58]) will accrue in some geographies and applications, but not all. Suggestions for increasing farmer capacity and incentives for sustainable rice production strategies include the following:

- Engage farmers in structured learning and exchange focused on understanding meaningful sources of evidence (e.g. farmers look at what their neighbours do) and forms of credit farmers perceive as useful (e.g. farm vs. household needs).
- Develop a producer support ecosystem through partnerships among cooperatives, input and service providers (e.g. irrigation; mechanization), and off-takers, which builds farmer trust and engagement (i.e. increasing likelihood of new practice adoption) and improves value chain accountability (e.g. fair practices by agro-dealers and aggregators).
- Improve capacity of agri-SMEs to deliver inputs, services, and markets to farmers and to access credit through enhanced professionalism.[59]
- Build technical assistance into finance structures.
- Cultivate additional off-takers for other products grown by rice farmers in rotation or in more diverse farming systems, where possible.

Blended finance is needed, but requires co-creation and effective implementation partnerships. Stakeholders consulted highlighted the potential for blended finance while noting that there is generally low familiarity with the key features of blended finance, such as additionality, and note that there are no off-the-shelf blended finance projects. This requires banks and other financiers to co-create value propositions with their clients, which they may only to be

[58] For example, the Remote Sensing-based Information and Insurance for Crops in Emerging Economies (RIICE) initiative has been tested in several South-East Asian countries. http://www.riice.org/about-riice/about-riice/

[59] High-functioning agri-SMEs are essential to agricultural transformation given their role in linking small-scale producers to inputs, services, and markets (e.g. operating as agro-dealers, machinery service providers, and primary off-takers) as well as the importance of their large collective investment in wholesale, logistics, and processing capacity (AGRA, 2019).

motivated to do for larger transactions and very established clients. Pre-investment feasibility assessments can enable banks with rice-sector clients to leverage their knowledge of the supply chain and clearly define the business case for smallholders (i.e. build finance strategies around candid assessment of on-the-ground realities). This type of assessment requires specialized technical consultants, with clear output-focussed mandates, developed in the context of a fit-for-purpose finance structure.

Blended finance should be lean and fast. Stakeholders recommended brutally simplifying and shortening deal steps to reduce bureaucratic delays (and intermediation costs) so that blended finance deals can be accomplished within time frames that address private-sector needs and business realities, including seasonality. This requires limiting the number of parties to only flexible, knowledgeable partners with aligned interests (i.e. focus on both financial and impact outcomes) and who are willing to collaborate proactively on solutions, rather than wait for a perfect deal to emerge.

Insurance could be complimentary, but requires subsidies. Insurance programmes can mitigate farmers' risks and have been linked to farm lending programmes (e.g. Côte d'Ivoire; Nigeria).[60] To date, the cost of insurance policies has been too high for most smallholders to afford without subsidies. Opportunities for more tailored pricing may emerge as sustainability variables (e.g. GHG emissions; water; soil quality) are embedded in risk models (i.e. beyond area-yield index approach and single-year focus), providing better understanding of when and how sustainability gains influence risks and revenue streams. Adaptation finance could be instrumental for testing innovative insurance models.[61]

[60] Insurers may cover new product development costs (models, etc.) when the volume is significant (e.g. two-digit million premium per year), but often expect co-financing in the context of multi-stakeholder or modest volume initiatives.

[61] For adaptation planning in rice production areas, it is important to determine if the problem is increased variability or a long-term trend toward crop unsuitability. However most studies are either very localized or very large-scale (some data may be in government reports rather than peer-reviewed literature).

4. Finance models to scale private sector investment in sustainable rice

Viable finance models

Based on the opportunities, challenges and approaches highlighted through consultation with rice sector stakeholders, scaling-up private sector investment to enable a transition to sustainable rice requires a mix of public and private action. Approaches based on increased access to public grants and concessionary finance, which characterizes the work to date of the SRLI, will also not be sufficient to overcome the financing needs of the transition to sustainable rice.

> *"Current conditions in rice production landscapes and value chains suggest that the major need is for **patient capital** made available in relatively **small amounts** for **context-specific uses** via **specialized counterparties and implementing partners**, and **de-risked by concessionary funders**."*

To meet the challenging financing requirements for promoting sustainable rice production, this section proposes three general structures (as well as a combined approach) that may offer viable models that can be adapted to specific geographies and context.

It is also important to note the following three points:

- The viability of these structures – or any sustainable rice finance initiative – will depend fundamentally on the suitability of potential project areas to support a transition to sustainable rice production, as discussed above.
- Selection of one of these finance structures for adaptation to a specific context will depend on findings from a pre-investment feasibility assessment.
- Any proposed structure would require identification of: (i) funding recipients such as local companies or financial institutions with demonstrated ability to engage rice growers and value-chain stakeholders in adopting sustainable production practices; and (ii) high-capacity providers of technical assistance (e.g. agri-SMEs; NGOs; research centres) and sustainability verification.

Many variations and combinations of the three potential structures summarized in Table 3 can be considered, including diverse opportunities for leveraging private capital through equity, debt, impact outcome payments, technical assistance, and grant funding. All three

structures could be financed through, or in collaboration with, companies (e.g. rice off-takers). However, a single-corporate approach may raise concerns about governance and conflict of interest if concessionary public funding is provided. Under all circumstances where commercial capital is engaged, there must be a basis for doing so, i.e. a meaningful net financial benefit that can reasonably be captured through increased revenues or cost savings.

Table 3 Potential blended finance structures for sustainable rice

ROLE	POTENTIAL STRUCTURES		
	Loan intermediation	**Credit guarantee**	**Special purpose vehicle**
Funding recipient	Entities capable of assisting rice growers and value-chain stakeholders in adopting sustainable production practices and technologies through value-chain incentives and/or financing mechanisms, such as the following: ● Companies (e.g. input and service providers, processors, traders, cooperatives, technology providers) to provide appropriate combination of off-take contracts, pre-financing of inputs and services, training, advisory support, infrastructure development, new market channels, disintermediation. ● Banks / financial institutions / insurers to provide appropriate forms of low-interest farm credit, working capital to agro-dealers, insurance.		
Financial intermediary	Local bank / financial institution: ● Uses new sources of capital to make loans based on pre-agreed criteria. Loans may be extended at improved rates or to new segments and/or initiatives.	Local bank / financial institution: ● Extends credit to a new or existing portfolio based on pre-agreed criteria. Expanded loan portfolio can recover part of the risk.	SPV: ● Provides more equity-like investment, e.g. to new technologies or approaches. ● Makes investments based on pre-agreed criteria.
Commercial capital provider[62]	Commercial capital provider(s) supply funds based on share of interest revenue.	Commercial capital provider(s) supply funds based on reduced risk.	Commercial capital provider(s) inject new capital into the SPV.
Concessionary funder	● DFI to provide capital *pari passu* or subordinated, possibly also grant-funded TA. ● Potential payment for impact outcomes.	● DFI(s) – guarantee is typically unfunded, may be subsidized.	● DFI – *pari passu* or subordinated, possibly also grant-funded TA. ● Potential payment for impact outcomes.
Local implementer	TA provider: local / regional agri-SME, NGO, or research centre. Standards and certification: Sustainable Rice Platform, GLOBALG.A.P.		

[62] Commercial capital can be used as equity, debt and hybrid or mezzanine structures including as credit lines, bonds, notes, term loans, convertible loans, etc.

Loan intermediation: *Dedicated credit access to an existing local or regional financial institution enables on-lending to rice growers and agri-SMEs*

In this structure, a local or regional financial institution (e.g. commercial or development bank, or MFI) would increase in-region lending by securing new sources of capital through additional dedicated credit from DFIs, donors, and/or commercial investors. This capital would then be loaned on to local SMEs in rice value chains, to farmers, and to rural households with finance structured as a loan programme, a credit line, or a securitization (e.g. bond- or note-issuing) programme. Loans provided in this way could be additional to what is currently available in the local market (in terms of interest rates, tenors, grace periods, terms, or other factors) and could be linked to demonstrable impact (e.g. reduced interest rate based on achieving certain impact key performance indicators; impact outcome payments). Concessionary capital could also be used to structure new products or provide technical assistance to the local or regional financial institution and its clients.

Potential benefits

- There is an existing financial intermediary with the appropriate legal setup to make and monitor loans in the local context.
- The financial intermediary is likely to have a track record in dealing with investors, including DFIs.
- The financial intermediary may have an incentive to scale this up and raise additional capital for the strategy without the need for concessionary finance if and when the business model is proven. In such cases, there is potential to integrate weather index insurance and other approaches to mitigate risks for example.

Potential drawbacks

- Despite being offered a dedicated credit line (and a fee or spread for managing this credit programme), the financial intermediary may not have the specific expertise or motivation to extend loans to rice growers and SMEs. There have been instances where such programmes have been allocated, but not utilized (e.g. targeted SMEs did not have sufficient collateral or track record).
- To be relevant to concessionary funders, DFIs and investors, this structure would need to be relatively large, requiring a suitable potential investment portfolio that can achieve the development objectives.

This on-lending approach can also be combined with guarantees (see below).

Credit guarantee: *Guarantees to an existing local or regional financial institution*

In this structure, a local or regional financial institution (e.g. commercial or development bank, or microfinance institution) would be provided with a guarantee to motivate them to allocate monies to desired rice-sector activities (within a new or existing portfolio). Guarantees could be offered on a deal-by-deal basis or on a portfolio level, or to support the issuance of a securitized (e.g. bond- or note-issuing) investment security and guided by pre-agreed criteria. This structure should help mobilize more capital into relevant local sustainable rice projects. Concessionary capital could be used to provide the guarantee or to subsidize it. It can also be combined with technical assistance.

Potential benefits

- Can require relatively little concessional funding for a large developmental impact (i.e. only a fraction of funds put aside as the loans are unlikely to all default at once).
- Potential to be used for smaller portfolio sizes.
- There is an existing financial intermediary with the appropriate legal setup to make and monitor loans in the local context.
- Can potentially help to unlock domestic capital, i.e. driving excess liquidity within the FI or in the local financial market.

Potential drawbacks

- To be sustainable, assumes that such loans can be made less risky over time or that the domestic financial system can eventually assume such risks, in order to reduce the dependency on guarantees.
- Assumes that financial investors value the guarantee in risk-return considerations.
- If done through a national policy bank, the government is likely to want to target a broader range of commodities than rice.

Special purpose vehicle: *Capital mobilization through an SPV*

In cases where there is no suitable investment counterparty or the potential investments are not attractive to local or regional financial institutions (e.g. due to risk profile, transaction cost, opportunity cost), it may be necessary to create an SPV to develop and execute desired rice-sector activities (e.g. additional working capital for farmers and cooperatives paired with pre-harvest support and off-take).

Through this equity-like investment approach, commercial capital can be mobilized based on pre-agreed criteria.

An SPV (e.g. investment fund, company, or foundation) could benefit from a blended finance approach in order to develop and implement the activities directly or through investments, partnerships, or results-based payments. Concessionary capital (e.g. grants) could also be used to provide technical assistance.

An example of this may be a regional or global blended finance investment fund that can provide long-term loans and technical assistance funding to achieve impact and potential financial key performance indicators.

Potential benefits

- More flexibility and likely higher risk appetite: This can eventually cater to any need, including proof-of-concept investments, very long-term, or speculative investments.
- Potentially more targeted, i.e. starting with a clean slate.

Potential drawbacks

- Potentially high setup and execution costs, in particular if SPV has its own staff, requiring sufficient scale to justify this approach (i.e. operate on a regional or global level, or in a country with sufficient scale such as India).
- May be necessary to include multiple crops, not just rice.
- Lack of track record can make it less attractive to DFIs and other funders. A partnership with an existing financial institution or fund manager might mitigate such drawback.

Global blended finance facility: *Combining multiple finance sources and approaches*

It is possible to combine multiple approaches into one larger facility or funding programme, potentially with support from a large multilateral funder such as the Green Climate Fund.

For example, such a facility could have three components:

- A loan portfolio with loans in the range of tens of millions of USD originated directly from larger companies or financial institutions and packaged into a bond of several hundred million USD to make

predominantly long-term loans, with a risk wrapper, potentially enabling investors to receive repayment in cash or in carbon, or a mixture (e.g. similar to the Forest Bond of the International Finance Corporation).

- A low- or zero-interest facility providing funding (e.g. up to USD 200 000) to smaller or more risky initiatives such as funding the deployment of new approaches or technologies alongside companies and research organizations. For example, this could be used to test a farmer input finance programme or a more efficient service delivery model. It could also be linked to third-party sustainability programmes, such as the Sustainable Rice Platform certification, potentially covering part of the certification costs, which could then be reimbursed over time.

- A technical assistance facility that could support project readiness, business plan development, impact monitoring (including potentially linked to landscape level carbon credit projects), and local capacity building. This could be administered by a technical assistance provider, such as the UN Food and Agriculture Organization.

The motivation of potential funding recipients to engage in blended finance structures will be influenced by the level of complexity (e.g. navigating DFI processes), risk (e.g. lending to small-scale farmers), and upside (e.g. profit potential), as well as alignment with government priorities. To be of interest to larger financial institutions, blended finance projects for sustainable rice will likely require aggregation of small-scale projects and demonstrated potential for replication. Blended finance will be appropriate in most projects given that commercial investors are not generally mandated for investments of this scale and type. Technical assistance and concessionary finance will be particularly important to leverage finance at scale from private and commercial investors through de-risking measures such as:

- capacity building among rice growers, local SMEs, and financial institutions (e.g. participatory R&D; training; monitoring and reporting);

- producer support 'ecosystems' (e.g. research-based agronomic advising; high-quality input supply);

- rice quality (e.g. phytosanitary monitoring) and traceability mechanisms;

- increasing consumer demand (e.g. for sustainability-labelled and / or domestically produced rice);

- higher risk technology R&D (e.g. energy generation; bioplastics from rice waste materials);

- supportive policies (e.g. for agricultural lending) and targeted producer or infrastructure subsidies.

Lessons from existing blended finance structures

Beyond the agriculture sector, there are existing blended finance structures that combine different funding instruments including debt, equity, results-based payments, guarantees, and technical assistance. Some examples include the following:

- Climate Investor One combines: (i) a development fund to provide loans to early-stage renewable energy projects; (ii) a construction equity fund to address renewable energy construction costs; and (iii) conventional project finance. This structure can cater to projects from early stage through to implementation and management.[63]

- The Forest Carbon Bond of the International Finance Corporation (IFC) is a principal-protected, fixed-income instrument designed to finance forest conservation and issued under IFC's AAA-rated programme. This structure uses the IFC's credit rating to raise significant funding at a relatively low interest rate and allows investors to be repaid in cash and/or in carbon credits.[64]

- Funds and facilities that primarily provide financing to local financial institutions can also provide direct financing accompanied by a technical assistance facility. For example, the Huruma Fund, which is managed by GAWA Capital and utilizes a EUR 10-million first-loss cushion funded by the European Union to leverage private investors,[65] and the EcoBusiness Fund, managed by Finance in Motion.[66]

- The Global Subnational Climate Fund combines a technical assistance facility and investments, including a junior tranche commitment of USD 150 million (20%) from the Green Climate Fund.[67]

- Funds that are invested in by corporates can benefit from development finance guarantees such as the Circulate Capital fund and the IDH FarmFit fund.[68,69] Such funds may also include technical assistance components or corporate payments for carbon credits, such as the Livelihoods Carbon Fund,[70] or other value chain benefits, such as Lestari Capital's Sustainable Commodities Conservation Mechanism.[71]

- Funding mechanisms that leverage corporate commitments can mobilize additional financial investment such as Clarmondial's Food Securities Fund,[72] Rabobank's Agri3 Fund,[73] and the BNP Paribas Tropical Landscapes Finance Facility.[74]

- Multilateral funds that can provide catalytic capital, including funding to develop and seed new financing instruments, notably the Global Environment Facility (GEF). The

[63] https://www.greenclimate.fund/project/fp099
[64] IFC, 2016.
[65] https://ec.europa.eu/eu-external-investment-plan/projects/huruma-fund_en
[66] https://www.finance-in-motion.com
[67] https://www.iucn.org/sites/dev/files/sncf_eng_presentation_april_2020.pdf
[68] https://www.circulatecapital.com/post/circulate-capital-and-usaid-team-up-to-fight-ocean-plastic-pollution
[69] https://www.idhsustainabletrade.com/farmfit-fund/
[70] https://livelihoods.eu/lcf/
[71] https://partnershipsforforests.com/partnerships-projects/sustainable-commodities-conservation-mechanism/
[72] Blended Finance Task Force. 2020.
[73] https://agri3.com/about/
[74] https://www.tlffindonesia.org

GEF has enabled investment funds including the Meloy Fund and innovative instruments such as the Landscape Resilience Fund.

- Emerging structures that utilize results-based financing such as Development Impact Bonds (DIB) include the UBS Optimus Foundation – Children's Investment Fund Foundation Educate Girls DIB,[75] and the DC Water Environmental Impact Bond.[76]
- Structures that create a renewable source of grant funding from industry include the Ocean Stewardship Fund associated with the Marine Stewardship Council.[77]
- Structures that free up resources for environmental investments include The Nature Conservancy Seychelles Debt Swap.[78]

The sample of blended-finance initiatives highlighted in the text box above offer potentially relevant lessons for sustainable rice financing approaches. The potential sources and structures of commercial capital must match funding needs, including in terms of scale, timing, risk appetite (e.g. currency and business model; maturity), projected returns, and liquidity. For landscape transformation, consideration must also be given to the mix of capital required, in the short, medium, and long term. For example, short-term capital to meet farmers household consumption and farming needs, as well as the needs of value-chain actors including input and trade finance, need to be considered alongside long-term investments, including in equipment and R&D.

Considerations for engaging private investors in sustainable rice

This section emphasized four approaches relevant for leveraging investment from the private sector in sustainable rice; particularly the need for patient capital and risk mitigation measures. Volumes of finance that can be mobilized range from the hundreds of thousands of USD to hundreds of millions. In general, DFIs, including providers of concessionary capital, are not well positioned to efficiently engage funding volumes less than USD 10M. Many commercial financial investors have limits on the percentage that they can represent in a transaction or investment structure (e.g. minimum USD 10 million commitment representing no more than 20% of the overall funding volume). If sustainable rice finance projects are to engage more commercial investors and DFIs, including multilateral funding pools such as the Green Climate Fund, the total volume should be at least a few hundred million USD. However, this must be aligned with on-the-ground funding needs, which typically from the hundreds of thousands to tens of millions. Given this size mismatch, an appropriate approach should consider multiple countries and allow for engagement at different points in the value chain and with a variety of counterparties.

Given the nascent level of experience with sustainable rice finance and the potential for unintended effects (e.g. expansion of unsustainable rice production; minimal income gain for farmers), pre-investment feasibility assessment and support will be critical to the success of projects. Especially in emerging and developing markets, finance structures

[75] https://instiglio.org/educategirlsdib/
[76] https://www.quantifiedventures.com/dc-water
[77] https://www.msc.org/what-we-are-doing/our-collective-impact/ocean-stewardship-fund
[78] https://philanthropynewsdigest.org/news/nature-conservancy-debt-swap-to-finance-conservation-in-seychelles

will need to be tailored to specific contexts and to account for commonly encountered challenges such as:[79]

- lack of data, both for assessing investments and credibly measuring sustainability outcomes;
- limited examples of comparable investments and few creditworthy counterparties;
- unsupportive or unpredictable policy, market, and currency contexts;
- relatively small, resource-intensive transactions and high intermediation costs; and
- low investment liquidity and long expected time to profitability.

In addition to the models outlined in this section, other approaches could include the following:

- A corporate bond issuance, although potential governance challenges of mobilizing concessionary capital at scale for a single agri-corporate suggest that a financial institution such as a commercial bank or development bank may be better suited to the issuance of a rice bond. This is particularly the case when rice is of strategic interest to a government and such government operates through a state-owned local development bank.
- Revolving low- or zero-interest credit (e.g. tied to SRP certification or improved practices in a captive value chain) although scaling may be challenging.

[79] Havemann et al., 2020

5. Opportunities in specific geographies

Geographic variation

The applicability and viability of the finance models discussed in the previous section will vary across geographies based on: the prevailing policy context; the strength of the financial and private sector actors engaged in the rice sector; and the nature of rice production value chains and landscapes in the country in question. In some countries, governments are signalling the importance of rice production through development strategies and sectoral policies,[80,81] and some countries or regions have been identified by development agencies and concessionary funders as priority areas for sustainable agricultural investment. This provides an enabling environment to encourage the partnerships in order to further opportunities to scale private sector investment in sustainable rice. Working capital and infrastructure investment are often scarce in many smallholder-dominated rice value chains, presenting potential low-hanging fruit. In some cases existing R&D,[82] environmental risk reviews,[83] value chain studies,[84] pilot projects,[85] or feasibility assessments can help to identify specific opportunities and accelerate the identification of viable projects.[86] In other cases, country-specific incentives may present additional barriers to the development sustainable finance opportunities.[87]

Sustainable finance initiatives will also encounter regional differences in prevalent practices and technologies in rice production landscapes. For example, patterns in smallholder mechanization exhibit strong regional signatures. In Asia, several factors have contributed to expanded mechanization in smallholder farming including smaller, multifunctional machines, improved land tenure supporting access to formal credit, and less-distorting government subsidies. Conversely, Sub-Saharan Africa still struggles with market failures (e.g. predominance of large tractors; lack of complementary technologies; insecure land tenure; weak access to formal credit) and unsupportive government action (e.g. import restrictions; inefficient promotional efforts).[88] In India, labour shortages under the COVID-19 pandemic have catalysed farmers to turn to drilling machines for sowing, possibly leading

[80] For example, Kenya's National Rice Development Strategy promotes a 7-fold increase in domestic milled rice production from 2018 to 2030 through market-led rice sector development hubs that integrate research products, services, and local innovations. https://www.cgiar.org/news-events/news/kenya-adopts-rice-sector-development-hub-approach-to-achieve-rice-self-sufficiency/

[81] For example, renewed government focus on rice as a revenue generator is reflected in Thailand's National Rice Policy, which will include price-stabilizing subsidies to almost 4 million farmers. (Reuters. Thailand approves $682 million in new rice insurance scheme. August 21, 2019.)

[82] For example, cost-benefit review of GHG mitigation technologies in paddy rice (Basak, 2016); residue management in Vietnam (Trong Hung et al., 2019); gaps in yield, profitability, water and labour productivity, nitrogen and phosphorus use efficiency in irrigated rice production regions in Vietnam, Thailand, Indonesia, Myanmar, Sri Lanka, and China (Devkota et al., 2019).

[83] For example, Colombia could lose 60% of land suitable for irrigated rice due to climate change (Castro-Llanos et al., 2019); Rice is a major contributor to India's AFOLU emissions and water use (i.e. 26% of India's 70 Mha of irrigated farmland, which is 50% of estimated irrigation potential) (FABLE, 2020).

[84] For example, review of rice millers' investment in technologies, contract farming, and vertical integration in West Africa (Soullier et al., 2020); rice modernization in Cambodia (Pant et al., 2018); rice mill processing efficiency in Nigeria (Pham, 2016; Johnson & Masias, 2016).

[85] For example, drip irrigation in Mali (Dexis Consulting Group, 2019); scaling up SRI (Styger & Traoré, 2018); rice farmer livelihoods and domestic rice competitiveness in Burkina Faso, Ghana, Nigeria, and Tanzania (GIZ-funded Competitive African Rice Initiative).

[86] For example, review of complementary interventions needed for smallholders to benefit from large dam-irrigated rice cultivation projects (Bazin, 2016); estimated benefits (reduced GHGs, water use) of improved production practices on 500,000 ha in the Mekong region (Nelson et al., 2020); estimated benefits of substituting crops for winter fallow in rainfed monocrop rice systems in India (Kumar et al., 2020).

[87] For example, there is ample state-subsidized credit in rural areas of China. India has ample financing for water projects. In Brazil, green Agribusiness Receivables Certificates (CRA) could direct finance toward bioenergy in rice. https://www.tmf-group.com/en/news-insights/articles/2018/november/brazils-new-regulation-on-cra/

[88] Diao et al., 2020.

to a longer-term shift in cultivation strategies.[89] Experience suggests that effective smallholder mechanization requires extensive collaboration among value-chain actors to promote and finance machinery service providers,[90] including matching mechanization technologies to context and resolving market distortions.

Higher-potential geographies

High-potential geographies for sustainable rice finance will have: significant need for finance to enable and incentivize sustainable production; basic capacity to effectively utilize finance within rice production landscapes and value chains; and viable financial, regulatory, and policy context for implementing sustainable rice projects.

Sustainable rice finance will be most applicable in Asia, where 90 percent of the world's rice is grown, although Sub-Saharan Africa and South America will also be important for a global transition to sustainable rice. The rice sectors in Australia and North America are unlikely to require blended finance strategies to further progress toward sustainable production. In general, mobilizing sustainable finance in developing countries is constrained by inadequate infrastructure, sector capacity, policy and institutional support, fragmented value chains, and risks (production, market, price).[91] Trade flows in rice are predominantly South-South.

Table 4 Patterns in rice production, consumption, and trade by regions and country classifications

REGIONS AND COUNTRY CLASSIFICATIONS	% OF GLOBAL PRODUCTION[92]	DETAILS
Asia	90.4%	Major producers: China, India, Indonesia, Vietnam, Thailand, Philippines, Japan, Pakistan. Major exporters: India, Thailand, Vietnam, Pakistan. Major importers: China, Iran, Saudi Arabia, Philippines, Indonesia
Africa	4.0%	Major producers: Egypt, Nigeria. In West Africa, increasing consumption / import burden (e.g. Côte d'Ivoire).[93]
Latin America / Caribbean	3.7%	Major producers: Brazil (9th largest globally, importer / exporter). Major consumers:[94] Ecuador, Guyana, Haiti, Panama, Peru.
North America	1.3%	Major producer: United States (importer / exporter)
Europe	0.6%	Major producers: Italy, Spain
Oceania	0.1%	Major producers: Australia, Fiji
Developed countries	3.6%	
Developing countries	96.4%	
Least developed countries	15.0%	
Organization for Economic Cooperation and Development	4.2%	
BRICS emerging economies (Brazil, Russia, India, China and South Africa)	52.1%	

[89] Signs of farm 'revolution' in India as coronavirus prompts change. Reuters. 22 July 2020. https://www.reuters.com/article/us-health-coronavirus-india-rice-insight/signs-of-farm-revolution-in-india-as-coronavirus-prompts-change-idUSKCN24O07M
[90] Van Loon J et al., 2020.
[91] FAO & CIAT, 2021.
[92] Based on volume of production during 2008-17 (Source: Table A.16.1 - Rice projections: Production and trade in OECD-FAO Agricultural Outlook 2018-2027).
[93] Challenged by low levels of irrigation / mechanization and minimal use of credit for purchasing inputs (Sheahan & Barrett, 2017).
[94] For example, in Brazil, 50% of rice growing areas have irrigation and mechanization is common in some areas.

The following regions and countries merit exploration for sustainable rice finance projects:

South Asia

Low productivity, informal trading, and difficult credit terms for farmers[95] challenge **Pakistan**'s fragmented local rice industry. Opportunities include improved productivity with certified improved seed, water saving through laser levelling, and labour saving through mechanical transplanting. With increased focus on increasing exports, import substitution, and reducing environmental impacts, the government has set a minimum quota for agricultural lending by national and provincial banks.

In **India**, low-productivity rice is a major contributor to national GHG emissions and water use.[96] Recent trade liberalization and the removal of price supports aim toward greater agricultural export. Farmer organizations and revenue-generating cooperatives offer potential local counterparties.

East and South-East Asia

The large scale of rice production, consumption, and export in **Vietnam**, an export gateway with high participation by rice sector companies, suggests strong investment potential. Low sustainability in production systems and high vulnerability to climate change point toward a strong need for sustainability-oriented investment.[97] Opportunities include mechanization, irrigation, improved varieties, land rehabilitation, and road networks. Cooperatives may be suitable local counterparties.

As the world's second-largest rice exporter, **Thailand** is recognized for its production of aromatic rice and as a potential new source of long-grain rice. With renewed focus on rice as a revenue generator, government-backed programmes have addressed the rice sector (e.g. zero-interest revolving-loan fund for rice farmers; agri-SME lending programme for land-levelling services).

China is a major rice importer given high domestic demand and grain prices, primarily from Thailand, Vietnam, Pakistan, and Myanmar. Domestic rice production is predominantly small-scale, with most rice purchased by the government at a low price. Potential for a sustainable rice transition is indicated by government focus on agricultural GHG reduction, poverty alleviation, and food safety and traceability, as well as by national experience with performance-based finance. However, ample state-subsidized credit in rural areas may reduce the opportunity for blended finance projects.

Sub-Saharan Africa

In **West Africa**, levels of irrigation and mechanization in rice production are low and use of credit to purchase inputs is nearly non-existent.[98] Sustainable rice finance projects could address infrastructure (e.g. irrigation) and working capital (e.g. improved inputs; mechanization services). Currency risk could be moderated in countries using the Central African Franc (e.g. **Benin**, **Côte d'Ivoire**, **Senegal**), and the Bank for Investment and Development of the Economic Community of West African States (ECOWAS) is developing rice-related financing.

Latin America

Producing mainly long-grain rice (i.e. higher quality; more expensive), **Brazil** is a major agricultural exporter with strong domestic R&D capacity and presence of major international input suppliers and off-takers in value chains. Among large producers, interest in differentiating their rice is growing. Finance opportunities include working capital for inputs, irrigation (combined with solar energy), and storage infrastructure.

[95] Microfinance is available, but rates are too high and size is too small.
[96] Rice represents 26% of India's 70 Mha of irrigated farmland (which is 50% of estimated irrigation potential) (FABLE, 2020). Potential for improved productivity, profitability, and GHG outcomes in rainfed monocrop rice systems by substituting ecologically adaptable crops (e.g. chickpea, lentil, safflower) for winter fallow with effective moisture conservation practices (e.g. rice residue retention) (Kumar et al., 2020).
[97] Improved practices (e.g. AWD; short-duration varieties; residue incorporation; efficient fertilization) on 500,000 ha in the Mekong region are estimated to avoid 1.4MtCO2e annually (and improve air quality with reduced burning) and to save 6M l/ha of water (and reduce saline intrusion) with an investment of USD 722M (81% for hard infrastructure; 18% for implementation, technology / infrastructure development, scaling, and MRV), over 20 years. Return on investment relies on carbon market revenues (Nelson et al., 2020).
[98] Sheahan & Barrett, 2017.

6. Developing finance structures for sustainable rice projects

The development process

This report has highlighted specific models and opportunities for scaling private sector investment in sustainable rice through blended approaches. Realizing these opportunities will require that stakeholders work through a development process that: defines the context-specific opportunities to shift farmers' and other value-chain actors' incentives toward sustainable practices and technologies; identifies entities with the capacity to manifest these opportunities (i.e. funding recipients) and develop suitable business models and project partnerships; and assesses appropriate types of financing (e.g. debt and/or equity, volume, tenor, cost) and viable funding sources (e.g. mix of concessional and commercial).[99] Table 5 outlines five key steps in the development process for sustainable rice finance projects based on the finance models discussed in section 4. Each step is described in further detail below.

Table 5 Steps for developing a sustainable rice finance project

1. ASSESS FEASIBILITY	2. DEFINE PROJECT	3. CONVENE PROJECT PARTNERS	4. DEFINE FINANCE STRUCTURE	5. IMPLEMENT AND MONITOR
Preconditions that will guide project design (see Table 3)	Combination of strategies to include in project (see Table 1) with estimated costs	Lean project partnership with clearly defined roles (see Table 4)	General finance structure selected / adapted to project context / objectives	Secure finance, implement, and monitor
High-quality in-region consultant	**1-2 initial / lead partners**	**1-2 initial / lead partners**	**All project partners**	**Based on defined partner roles**
• Spatial / technical feasibility • Sustainability potential • Value chain opportunity • Scaling viability • Export / import substitution	• R&D • Agronomic support • Inputs and services • Off-take infrastructure • Market building • Finance mechanisms	• Funding recipient • Capital provider • Concessionary funder • Financial intermediary • Local implementer / TA provider	• Credit guarantee / SPV / loan intermediation • Volume, tenor, criteria, cost • *Pari passu* / tiered	• Mix of concessional / commercial finance • Sustainability verification

[99] While specific financing structures can take many forms, there a just a few fundamental strategies: (i) Lending for operational or capital expenses in the form of loans, bonds, credit lines, etc. (ii) Equity stakes in agri-companies (e.g. service provider; processing company; technology developer) or investment vehicles (e.g. agriculture impact fund). (iii) Insurance for defined types of losses (e.g. in production; supply chains; markets / prices).

Step 1 – Assess feasibility

Experience to date offers insight about the range of sectoral, technical, value chain, capacity, financial, infrastructure, data, legal, regulatory, and trade pre-conditions that will be important success factors for sustainable rice finance projects. Table 6 specifies preconditions that should be considered in project design, and which will be important elements of pre-investment feasibility assessment.

Table 6 Pre-investment feasibility assessment needs and strategies for sustainable rice investments

ASSESSMENT NEED	ASSESSMENT STRATEGIES
Spatial assessment for technical feasibility	• Studies determining which rice-producing regions need reduced variability (e.g. reliable yield, income insurance) or systemic change (e.g. adapting to salinization, drought, or even transitions to new production systems). • Assessment of environmental viability at scale of interventions (e.g. hydrological assessment for mass deployment of rice irrigation; potential conversion of land use practices). • Scan for in-region agronomic and value-chain information (e.g. soil maps, labour supply, road networks, variety registration and seed multiplication systems).
Evidence of potential to transition to sustainable rice production	• Evidence from in-region R&D for improved rice production practices and technologies (e.g. improved varieties, water management) and/or value addition (e.g. drying for local millers). • Pilot tests demonstrating farmer adoption (e.g. single improved practices, technologies or packages, percentage, spatial patterns), farm-level return on investment (ROI), and willingness to participate in farm credit programmes. • Presence of regional TA providers (i.e. local consultants and NGOs with relevant expertise) and other local enablers (e.g. municipal government).
Basic evidence of value chain opportunity	• Mapping of current value chains (e.g. who produces and where, who buys, which rice is consumed domestically vs. exported, location of mills, quality segmentation, prices) including cooperatives and other farmer groups. • Capacity for last-mile service provision by viable or bankable upstream companies (e.g. certified seeds and other inputs, mechanization service providers, advisory services). • Quantified market opportunity in rice (e.g. production volumes; profit margin on intended rice varieties; time lags) and other revenue streams (e.g. alternative crops, rice husks). • Anchor entity to mobilize commitments among essential partners and shepherd complex multi-partner project (e.g. administration, quality control, data-sharing). • Presence of large input suppliers or off-takers looking for more extensive involvement upstream (e.g. potential for off-taker commitments). • Entities with demonstrated ability to import equipment (e.g. transplanters, harvesters). • Mapping of political dynamics, domestic subsidies, land tenure context, and regulations governing producers and processors.
Viable mechanisms for scaling	• Alignment of value chain and financing strategies with government policies and priorities. • Viable entities (e.g. service providers) or mechanisms (e.g. technologies as proxy for sustainability) to monitor farmer adoption, sustainability changes, and compliance with certification schemes. • Pilot tests demonstrating adoption and viability of digitization platforms. • Entities to lead on inclusive finance (e.g. alternative collateral, as well as screening for risks).
Opportunities and barriers for rice export or import substitution	• Mapping of regulations and tariffs of intended international markets (e.g. maximum residue limits, processed product allowable). • Market studies of preferred varieties among domestic consumers.

Step 2 – Define project

Major strategies to increase the use of sustainable rice practices and technologies are summarized in Table 1 earlier in the report. These strategies could be deployed individually, but they are more likely to be combined to support identified needs and opportunities in specific rice production landscapes and value chains. Combined strategies might be financed collectively through a partnership-based investment structure or different investors might fund specific strategies while coordinating with project partners. Table 7 illustrates how sustainable rice projects might combine strategies to achieve their objectives.

Designing targeted, effective, flexible, and efficient farmer incentive programmes that account for spatial and economic differences requires cost-effective collection and analysis of detailed data (e.g. for estimating environmental outcomes, for tracking programme costs).[101]

Table 7 Examples of possible combined strategies to achieve sustainable rice project objectives

EXAMPLES OF POSSIBLE COMBINED STRATEGIES	R&D	AGRONOMIC SUPPORT	INPUTS AND SERVICES	OFF-TAKE INFRASTRUCTURE	MARKET BUILDING	FINANCE MECHANISMS
Achieve import substitution by identifying locally preferred rice varieties, validating improved practices for local rice production systems, and establishing new domestic value chains.	X				X	
Increase rice productivity and sustainability through investment in agri-SMEs providing last-mile delivery of soil testing, agronomic advisory, and high-quality inputs (e.g. locally blended fertilizers; improved rice varieties), paired with subsidized farm credit.		X	X			X
Increase use of certification standards by estimating sustainability outcomes within a specific rice-production region, building dedicated storage and transport infrastructure, establishing traceability mechanisms, and securing off-take guarantees from rice traders who will seek a higher market price for sustainability-labelled rice.	X			X	X	
Increase rice productivity through mechanization by de-risking equipment import, sales, and/or contract-based service provision.			X			X
Increase socio-economic and biophysical resilience through diversification of rice production systems (e.g. appropriate crop rotations replacing winter-fallow),[100] supported by grant-funded TA, subsidized loans to agro-dealers supplying seeds for rotation crops, and off-take guarantees for rotation crops.		X			X	X
Promote improved waste management through equity investment in a local start-up company that will advise and equip local mills for energy generation with waste rice husks.					X	X

[100] Kumar et al. 2020.
[101] Piñeiro et al., 2020.

Step 3 – Convene project partners

If a pre-investment feasibility assessment determines that a sustainable rice finance project is viable and beneficial and an appropriate combination of strategies has been developed, the next step is convening the parties that will contribute to the project. Given the nature of sustainable rice finance opportunities (e.g. low margin; uncertain return), lean project partnerships are recommended, where each partner's contribution is unique, essential, and clearly defined and there are no unnecessary costs. Structures should seek to limit partners to irreducible roles and partners should be identified based on clearly defined additional value relative to other potential institutions (see Table 8).

Table 8 Potential roles and required characteristics for sustainable rice finance project partners

ROLE	ROLE	REQUIRED CHARACTERISTICS
Funding recipient	Medium-size or large agri-sector company (or cooperative), regional development bank, or local financial institution (e.g. a state-owned enterprise or state bank) with capacity and motivation to assist rice growers in adopting sustainable production practices and/or technologies through value chain incentives and/or financing mechanisms. For example: off-take contracts, pre-financing inputs / services, training / advisory support, infrastructure development, new market channels, disintermediation, low-interest farm credit, working capital to agro-dealers, insurance.	• Companies (e.g. input / service providers, processors, traders, registered cooperatives, technology providers) that are financially viable (ideally publicly listed) and have a core business interest in sustainable rice sourcing. • Bank / financial institutions / insurers with extensive exposure to rice production areas and experience with financial inclusion (e.g. crop-based collateral, alternative risk screening, proxy credit histories). • Capacity to leverage local connectivity (e.g. franchise networks, local bank offices) and willingness to engage partnerships (e.g. for holistic service delivery to farmers). • Compelling value proposition with quantified ROI for farmers, agri-SMEs, off-takers, financiers, etc. that is not reliant on long-term concessionary support. • Commitment to transparency, monitoring, sustainability assurance mechanisms, etc.
Capital provider	Private sector investors providing capital on a commercial basis (i.e. seeking risk-adjusted financial returns).	• Appropriate expectations for risk-return, tenor, liquidity, etc. • Commitment to financial and impact outcomes and experience with blended finance structures.
Concessionary funder[102]	Bilateral / multilateral donor, philanthropy, or (sub)national government to de-risk commercial investments through appropriate mechanism (e.g. loan guarantee, complementary investment) and conduct due diligence.	• Appropriate mandate and experience in region and rice sector. • Capacity to fast-track blended finance deals. • Capacity to engage government as a partner (e.g. subsidized insurance, machinery, enhanced seed systems).

[102] See annex for examples of major concessionary funders in sustainable agriculture.

Table 8 Continued...

ROLE	ROLE	REQUIRED CHARACTERISTICS
Financial intermediary[103]	A local / international bank or non-bank financial institution with capacity and motivation to: (i) co-create a value proposition based on robust analysis of the business case for farmers, service providers, off-takers, etc.; (ii) co-invest (e.g. finance pre-investment feasibility assessment); (iii) resolve mismatch between small working capital needs and large deal size requirements; and (iv) shepherd a complex deal, and minimize extraneous costs and bureaucratic delays.	• Relevant organizational or governmental mandate, and willingness to take a financial stake. • Deep local knowledge (e.g. rice supply chains, regulatory / trade context) and existing business lines / clients (e.g. commodity trade finance, advisory, off-takers). • Appropriate legal status and credit worthiness. • Local presence / network and experience of cultivating viable, bankable investees. • Can use local language and currency (or manage currency risk). • Experience with blended finance / climate finance and associated due diligence / administration (e.g. credible governance, track record, robust data systems).
Local implementer / technical assistance provider[104]	Local / regional agri-SME, NGO, or research centre, with proven ability to provide appropriate training, advisory, diagnostic, mechanization, seed multiplication, aggregation, digitization, or other services in support of project objectives.	• Robust, relevant, and pragmatic technical expertise. • Established working relationships with local government, farm groups, and value chain companies. • Demonstrated capacity to effectively and efficiently engage farmers / agri-SMEs (i.e. farmer-centred approach).[105] • Viable business model for long-term service provision (i.e. not dependent on ongoing concessionary funding).

Step 4 – Define finance structure

Adapting the potential finance structures described in section 4 to specific rice production regions will depend on the results of the pre-investment feasibility assessment. Technical and financial feasibility will inform the criteria for lending, investment, selection, and mandating of local implementing partners (e.g. training; input provision; machinery services; crop aggregation). Pilot tests will clarify implementation costs (e.g. last-mile delivery; due diligence) and risks (e.g. side-selling; low farmer adoption). Value chain mapping will enable estimates of potential sustainable rice production volumes and market demand, as well as identification of barriers (e.g. regulations; tariffs). Assessment of scaling potential will reveal any gaps (e.g. bankable investees in farming landscapes) or socio-political misalignment.

This information can be integrated to answer key design questions, including but not limited to the following:

- What is the size of potential sustainable rice portfolio (e.g. unmet demand for credit)?

[103] For example: Bank for Agriculture and Agricultural Cooperatives -Thailand; Rabobank, DBS Bank; BNP Paribas.
[104] For example: CGIAR/IRRI, GACSA/ASEAN GACSA; Sustainable Rice Platform (sustainability certifier).
[105] For example: 'No regret' mitigation strategies in rice production.' http://climatechange.irri.org/projects/mitigation/assessing-incentives-for-scaling-up-mitigation-at-different-stakeholder-levels-no-regret-mitigation-strategies-in-rice-production

- What activities and infrastructure are essential for incentivizing sustainable rice production (e.g. working capital; technical assistance; infrastructure; land acquisition / rehabilitation; sustainability verification)?
- What types of funding terms are appropriate (e.g. currency; terms; tenor)?
- Who are the most suitable and motivated counterparties (e.g. cooperatives; agri-SMEs; large companies; individual farmers)?
- What are acceptable intermediation costs?
- Could this structure be feasibly replicated in rice production landscapes with similar technical and economic conditions?

Table 9 illustrates how the finance structures described in section 4 might be applied in countries and regions that appear to have higher potential for sustainable rice finance projects (as described in section 5).

Table 9 Illustrative examples of potential structures for sustainable rice finance

EXAMPLE	LOCATION	DESCRIPTION
Loan portfolio guarantee programme	Regional or national	Enable a local financial institution to expand lending for sustainable rice activities via: ● Credit guarantee from an international FI or DFI (potentially shared with the government) to enable expanded lending based on existing market liquidity. ● Additional credit lines from international sources to on-lend in rice landscapes.
Co-investments programme	Regional or national	Investors (DFIs / commercial) provide capital to a co-investments programme (on-going participation or fixed term) to a loan facility managed by a local FI, increasing its capacity. Defined lending criteria could allow for longer-term funding needs (mechanization or capex) or for financial inclusion in rice farming landscapes. DFIs (or government) could provide a subordinated position or cover costs associated with loan origination, servicing, etc.
Domestic de-risking pool	National or regional	Establishment of a de-risking pool, to be managed by a local FI, to facilitate investments by the rice industry and financial sector, focused on improved credit terms to enable farmers to invest in rice productivity (e.g. certified improved seed, laser levelling, mechanical transplanting / harvesting), in a policy context emphasizing agricultural lending, exports, import substitution, and environmental impacts.
SRP-related funding programme	Regional / international	Issuer / counterparty (likely a company) would issue a green bond or start a green loan programme linked to an SRP-compliant rice value chain. A DFI could provide de-risking / guarantees, and the borrower could pay a variable interest rate linked to sustainability performance.
Rice investment facility	Regional	Co-investments programme focused on mechanization and irrigation, in a context of varying national and sub-national agricultural input use policies. A DFI could provide de-risking / guarantees and potentially capital for on-lending, complemented by regional development funds.

Table 9 Continued...

EXAMPLE	LOCATION	DESCRIPTION
Green bond	Global, regional (e.g. Africa or Asia) or national	Global, regional or local financial institution issues a green bond for a use of proceeds linked to sustainable rice landscapes. The bond is partially guaranteed or provided with a risk wrapper to reduce the borrowing cost. Improved credit profile (risk rating) and impact outcomes motivate bond investors.
SRP-related revolving funding pool	Regional / international	Establishment of a facility providing funding for pre-agreed costs associated with SRP compliance / verification, reimbursable SRP certification is achieved. Pool structure can kickstart SRP uptake and facilitate private sector investment (i.e. replenishment of a 'sinking' pool). Note that in this case it would be unlikely that a purely financial investor would benefit; the private sector leverage would come from companies in the rice sector (e.g. millers, traders).

Step 5 – Implement and monitor

Developing an appropriate funding structure will require resources to further ascertain the funding needs, counterparty quality, and options for risk mitigation and revenue enhancement. Strategic investors (i.e. ones that are able to anchor a structure with a meaningful volume and/or provide credibility to a structure), should be engaged early in the structuring process. For example, potential concessionary funders that might provide guarantees or other forms of risk-absorbing capital should be consulted as a matter of priority. However, the level of engagement required for purely financial investors also depends on the structure; a rice bond issued by a credit-worthy development finance institution may require less effort to market compared to a rice-related investment fund. There will be many variations on the specific steps to be taken depending on the identified financing needs and the preferred funding approach. Given the likely complexity of developing a comprehensive funding structure to address rice value chains, it will be important to minimize upfront transaction costs (i.e. a lean management structure with a small number of well aligned and highly committed partners) and to ensure value for money from all partners, including service providers such as partner banks, along the way.

An impact assurance mechanism will be essential to any sustainable rice finance project, for credibly monitoring and verifying the following aspects:

- Beneficiaries such as independent smallholders, members of cooperatives or farmer field schools, farming communities (including youth and women), ecosystem services (e.g. forests; water systems; wetland species of bird and amphibians), local and international companies (including last mile financial services providers), and sub-national and national governments.

- Impact type and magnitude such as food security (e.g. resilience to drought; saltwater intrusion, higher temperatures; pest and disease), rural revitalization (e.g. import substitution by locally produced or processed rice), economic development (e.g. market access; export), GHG emissions reduction, reduced degradation of water resources, sustainable intensification (i.e. increasing yield per area).

The Sustainable Rice Platform (SRP), a global multi-stakeholder alliance launched in 2011, has developed a voluntary sustainability standard to promote resource-use efficiency and climate-change resilience in rice value chains. The SRP Standard promotes voluntary market transformation by offering a normative framework for substantiating claims of sustainability performance in rice supply chains that emphasizes minimizing the environmental impacts of rice production and consumption, while enhancing smallholder incomes and contributing to food and water security. Released in January 2019, Version 2.1 of the SRP Standard for Sustainable Rice Cultivation specifies forty-one requirements to be applied to all farm-level processes.[106] The Standard is complemented by the SRP Performance Indicators (PIs),[107] which consist of 12 impact categories, each with a number of quantitative indicators and measurement methods. Together, these tools offer a definitional basis for sustainability in rice production, and a recognized impact framework to monitor and reward performance. Overseen and managed by GLOBAL G.A.P., the SRP Assurance Scheme is based on the SRP Standard and offers three assurance levels: (i) farmer self-assessment with farmer group verification; (ii) external verification; and (iii) accredited verification. Using a 0-100 scoring scale, the SRP Standard enables step-wise compliance (i.e. continuous improvement) toward defined thresholds of "sustainably cultivated rice."

The SRP Standard's guidance for data collection stipulates that data should be collected for the full set of PIs, except where a subset of PIs is sufficient for the production context, intervention strategy, or available resources. This allows full visibility on impacts, and an understanding of trade-offs among desired impact categories. A pre-intervention baseline should be used to monitor project-related improvement at the end of each crop cycle. Data sources can include high-quality farmer records, farm visits (by implementing partners), household surveys, laboratory tests, cooperative accounts, government data, or data from international research centres. Sampling of representative participating farmers (with gender disaggregation) and data collection from a control group of non-participating farmers (to confirm plausible contributions and attributability). Implementation partners (e.g. farmer group leaders, service providers, extension workers, research institute, company, project owner, rice miller) work toward intermediate or advanced levels of data quality.

Given the recent vintage of the SRP Standard, it is not yet clear if certification under this scheme can garner discounted insurance premiums or loan interest rates based on the presumption of reduced risks associated with SRP-certified rice operations. With credit-worthy borrowers, in particular those with foreign currency earnings, experiencing relatively low credit costs given global macroeconomic conditions, transaction margins may be too small to allow for meaningfully discounted interest rates. In general, intermediation fees are quite lean, and need to be considered against relatively high intermediation costs for complicated transactions (e.g. regulatory and tax compliance, structuring, marketing), leaving little room to compensate for certification costs. Within a blended finance structure, concessionary funding of a technical-assistance facility might be organized toward SRP compliance.

[106] Version 2.1 of the SRP Standard for Sustainable Rice Cultivation was created based on an ISEAL-compliant revision of Version 1.0, together with findings of multi-country field pilots. Version 3.0 will be released in 2022. http://www.sustainablerice.org/Resources/

[107] Net income; labour productivity; grain yield; water use efficiency; nitrogen use efficiency; phosphorus use efficiency; biodiversity; GHG emissions; food safety; worker health and safety; child labour and youth engagement; women's empowerment.

7. Summary and next steps

Summary

Given their tremendous importance for food security, livelihoods, environmental sustainability, and climate mitigation, cultivating viable blended finance models for sustainable rice production landscapes is necessary. While the challenges of achieving upstream productivity and resilience are not trivial, the existing knowledge base for sustainable practices and technologies can be harnessed toward a pragmatic, impact-focused learning agenda. Based on the discussions held with stakeholders and value-chain participants, some consistent themes and recommendations for promoting and financing sustainable rice were identified including the following:

- **Upstream value creation is paramount**. Farmers and service providers in production landscapes need value propositions (e.g. agronomic packages, financial services, and income opportunities) that work in their real-world context.

- **Cash flow is key**. Solutions are needed to address payment delays and profit erosion across long value chains, and to mitigate fluctuations in farmer incomes throughout the year.

- **Trusted business relationships are needed along the value chain**. Trusted relationships amongst value-chain actors are essential for reducing side-selling in the context of pre-financing and off-take agreements.

- **Capacity of essential enablers needs strengthening**. To bring effective, bankable counterparties to finance sustainable rice, strong local capacity amongst essential enablers (e.g. cooperatives; agri-SMEs; off-takers) in rice production landscapes is required over the long term.

- **Money alone will not overcome the challenges**. Technical assistance (TA) and service provision need to be embedded within financial structures.

- **Size mismatch inhibits finance**. De-risking and finance mechanisms need to be adapted to relatively small funding needs at the farmer level (e.g. aggregating similar projects to support larger investments).

- **There are no off-the-shelf blended finance projects**. Value propositions need to be co-created based on pre-investment feasibility assessments.

These perspectives suggest that transitioning to sustainable rice production will require a mix of funding sources and instruments, the most catalytic likely being long-term patient capital for context-specific uses via high-quality local counterparties and implementing partners,[108] and de-risking by using concessionary funders (i.e. funders that provide capital on terms lower than the commercial market rate). Possible forms of patient capital suitable for leveraging private-sector investment in sustainable rice considered in this report with relevance for certain geographies including loan intermediation, credit guarantees and SPVs.

[108] 'Patient capital' providers are willing to invest for the long-term (over 5 years), have a higher risk tolerance, and in some cases, are willing to accept lower financial returns in exchange for social and / or environmental impact.

Bringing different elements of these models together in partnership with the public sector under a blended finance initiative will likely be needed to meet the scale of the challenge and the different risk return profiles that prevail amongst different value chain actors interested in promoting sustainable rice.

Next steps

This report has outlined the process and steps that will be required to achieve a successful blended finance initiative that can scale private-sector investment in sustainable rice and get it off the ground. Given the relatively high cost and complexity of designing blended finance structures, the organizations that have developed this report and the SLRI should move ahead as a matter of priority to answer key design questions including target regions, funding mix and potential impact and scale while engaging with multiple counterparties in rice landscapes interested in driving a transition to sustainable rice for the benefit of rural households and the environment. Specifically, the following actions are proposed:

1. Engage with potential transaction counterparties in South Asia (Pakistan and India), South-East Asia (Vietnam, Thailand, potentially Cambodia, Indonesia, and the Philippines), and Sub-Saharan Africa to better understand their funding needs and challenges with respect to rice landscapes and identify potential specific transactions at the local or regional level.

Implementing change will only be possible if organizations exist that can take long-term responsibility for, and have a strategic business interest in, sustainable rice landscapes. Financiers require transaction counterparties that have appropriate expertise and size, and that can be held legally accountable. To move forward, key private-sector entities operating in, or with the potential to operate in, rice production landscapes, such as farmers' organizations, input providers, millers, trader and buyers (brands), must be identified, and work undertaken to better understand their financing needs and challenges, as well as their bankability.

2. Assess the potential for a global or multi-regional, rice-focused, funding facility that would provide the base for sufficient capital mobilization in emerging markets and combine a variety of funding instruments (e.g. loans; technical assistance; grants or other concessionary funding).

Scale is important in mobilizing additional funds from key donors as well as the capital markets (private finance). However, while capital must be mobilized at scale, it must be deployable across the range of sizes and types of counterparties that can enact change. Realizing the opportunities identified in this report requires engagement with key public and private funders to understand minimum size thresholds, preferred financing instruments and other characteristics that would increase the likelihood of sufficient capital mobilization. Potential transaction counterparties and intermediaries also need to be engaged at an early stage to understand their priority funding needs, in terms of instruments, timeframe, cost and other conditions.

3. Investigate the potential for rice landscapes to support emissions reductions under Article 6 of the UNFCCC Paris Agreement aligned with country-led initiatives for climate change mitigation and adaptation, including NDCs.

Rice production is a major staple but also a source of GHGs. It is therefore an important sector in several countries' NDCs and NAPs. Emerging and developing markets will require additional funding to meet their rice-related NDC priorities. This may also be an opportunity for mobilizing multilateral, bilateral and private climate finance. Further work is required to assess the current and

expected future inclusion of rice landscapes in NDCs. Also, additional analysis is required to understand the strategies and governance frameworks required of developing and emerging markets for attracting additional funding (private and public) for NDCs through Article 6 of the Paris Agreement, the use of jurisdictional approaches, and nesting of voluntary carbon market transactions. As part of this analysis, rice finance project developers and finance providers will need to assess the level of interest of carbon credit buyers, both compliance-driven and voluntary, in their transactions.

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Appendix A: Glossary

Agri-SMEs	Small- and medium-sized agricultural enterprises
Alternative collateral	Non-traditional form of security for a lender in the event of repayment failure
Bankable	Representing an acceptable risk to a bank or other lender
Bilateral / multilateral governments	Funding provided directly from a government / from numerous
BRICS	Five major emerging economies: Brazil, Russia, India, China, and South Africa
Commercial	Investment funding seeking risk-adjusted financial returns
Concessionary	Development-oriented funding from public or philanthropic sources
Debt	Lending in the form of loans, bonds, credit lines, etc.
De-risk	Reduce the likelihood of a financial loss
DFI	Development financial institution
Disintermediation	Removing a middleman or intermediary from transactions
Due diligence	Systematic analysis of potential investment risk
Equity	Ownership stakes in agri-companies or investment vehicles (e.g. impact fund)
GHGs	Greenhouse gases
Impact	Beneficial environmental or societal effects
IFI	International financial institution
KPI	Key performance indicator
Last mile	Final segment in delivery of products or services (often complex or costly)
Market channel	Platform through which products move from producers to consumers
Mezzanine	Debt financing to bridge a gap between debt and equity financing
NGO	Non-governmental organization
OECD	Organisation for Economic Co-operation and Development
Off-take	Purchase of goods from producers
Pari passu	Assets or investors that are on 'equal footing'
R&D	Research and development
ROI	Return on investment
Risk-screening	Procedures to assess the likelihood of potential investment losses
Smallholder	Farmer operating a small land holding
SME	Small- and medium-sized enterprise
SPV	Special Purpose Vehicle
Subordinated	Debt in the form of an unsecured loan or bond with a junior position
TA	Technical assistance
Value proposition	Set of benefits offered to potential clients or partners

Appendix B: Organizations consulted

African Development Bank (AfDB)

Asian Development Bank (ADB)

Aavishkaar Capital

Axfood-Dagab

Ax Foundation

Axis Bank

Bayer

Better Grain / RPL

Bill & Melinda Gates Foundation

BIO Company

BNP Paribas

CDC

Clarmondial

Department of Foreign Affairs and Trade - Australia (DFAT)

European Investment Bank (EIB)

Food and Agriculture Organization of the United Nations (FAO)

Foreign, Commonwealth & Development Office – UK (FCDO)

Finnfund

Financierings-Maatschappij voor Ontwikkelingslanden N.V. - Dutch Entrepreneurial Development Bank (FMO)

Galaxy Rice

Green Climate Fund (GCF)

Global Environment Facility (GEF)

Global Green Growth Institute (GGIGI)

Gesellschaft für Internationale Zusammenarbeit (GIZ)

Green Invest Asia

HBL Bank - Pakistan

IDH FarmFit Fund

International Finance Corporation (IFC)

Institute of Policy and Strategy for Agriculture and Rural Development – Vietnam (IPSARD)

International Rice Research institute (IRRI)

Ministry of Natural Resources and Environment - Vietnam (MONRE)

National Electric Authentication Centre - Vietnam (NAEC)

New Partnership for Africa's Development (NEPAD) / Grow Africa

Netafim

Nigeria Incentive-Based Risk Sharing System for Agricultural Lending - Nigeria (NIRSAL

Olam

OSS

Rabobank

Samunnati

Swedish International Development Cooperation Agency (SIDA)

SNV Netherlands Development Organisation (SNV)

Sustainable Rice Platform (SRP)

SunRice

Syngenta

Rice Department - Thailand

UBS Optimus Foundation

United Nations Environment Programme (UN Environment)

World Business Council for Sustainable Development (WBCSD)

World Bank Group

YES Bank

Appendix C: Summary – Vietnam roundtable

Financing sustainable rice in Vietnam: A roundtable discussion

Held on 8 September 2021. Hosted by the Sustainable Rice Landscapes Initiative (a consortium of WBCSD, SRP, FAO, GIZ, UNEP and IRRI) and the Just Rural Transition.

Contributors
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Thomas Howard, SunRice
Beau Damen, FAO
Jens Treffner, GIZ
Linh Nguyen Sy, MONRE
Ole Sander, IRRI
Tran Thu Ha, SNV
Nguyen Viet Khoa, NAEC
Tran Cong Thang, IPSARD
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Luis Miguel, GGGI
Ahmed Eiweida, World Bank Group
Rajesh Behal, IFC
John Jeong, ADB
Hannah Wood, UBS Optimus
Gaetan Henrinckx, BIO
Bas Rekvelt / Warren Kemper, FMO
Sami Khan, CDC
Hans Loth, Rabobank
Jari Matero, FinnFund
Ryan Thew, Aus DFAT
Nick Boerema, Green Invest Asia

Moderator
Beau Damen, natural resources officer at FAO Regional Office for Asia and the Pacific

Executive summary

- **There is growing interest from capital providers in investing in sustainable rice in Vietnam**. This is in part due to an increased appreciation for rice's potential as a climate solution, owing to significant methane production from rice paddies.

- **DFIs are limited from investing in smallholder or mid-sized rice operations by minimum ticket sizes**, which amongst the capital providers present ranged from USD 1 million to 25 million. However, there is scope to invest in other parts of the value chains, with off-taker programmes, processors and even distributors representing potential investment entry points.

- **Unique to Vietnam is an appreciation for the use of public-private partnerships (PPPs)**, mentioned by public, private and finance actors as a useful tool for encouraging financial and technical support in Vietnam. The establishment of the PPP taskforce in Vietnam in 2017 is helping to further this cause. It was underlined that **no one actor can fund sustainable rice alone**.

- **Results-based finance is becoming increasingly achievable in Vietnam**, as measurement of the environmental impact of rice and savings from climate-smart methods becomes more readily available.

- **Finance must be combined with technical assistance at the farm level**. Several off-takers noted that an over-application of fertilizers and pesticides by rice farmers means their crop often exceeds maximum residue levels (MRLs), preventing exports to higher-value markets. Schemes working at the farm level to reduce pesticide use to suitable levels have had some success, but require scaling.

Summary of discussion

The following roundtable discussion, organized by the SRLI, discussed the challenges and opportunities surrounding sustainable rice in Vietnam. It brought together public and private actors involved on the ground in Vietnam with capital providers from development banks, DFIs and private capital.

After an introduction from the moderator (Beau Damen, FAO), Tanja Havemann framed the context of the roundtable. Moving to more sustainable forms of rice production offers valuable opportunities to address a number of environmental and societal goals. Financing the investments needed to unlock this value has been challenging, with multiple barriers leading to significant financing gaps in Vietnam. However, by co-developing innovative partnerships, there is potential to scale the finance needed. Specifically, solutions must be tailored to the region and create value for all stakeholders (including farmers, who are often financially excluded). Challenges remain in relation to trust and side-selling, which make pre-financing for smallholders difficult. There is also a need for technical assistance and capacity building across the supply chain.

The roundtable continued with inputs from private- and public-sector actors on the challenges and opportunities for sustainable rice in Vietnam, followed by reactions from capital providers. Reactions from capital providers are in purple.

Climate change is an increasingly important consideration amongst all actors in the rice value chain. One DFI noted that climate change was a key concern for their portfolio, with a climate-change evaluation performed on all their investments, meaning any rice investment would necessarily have to have a climate-mitigation component. The climate impact of rice has historically been poorly communicated; a speaker noted that one hectare of rice paddy in the Vietnamese lowland context emits the same annually as a Toyota Corolla driven once around the equator.

Government representatives highlighted the **importance of rice as part of a wider natural capital strategy** at national level, with the potential for low-carbon rice to be factored into NDCs in line with the Paris Agreement. **However, it was noted that incentives for climate-smart rice production are lacking**, with food and agriculture not enjoying the same incentive and subsidy schemes available for the transport and energy sectors.

Rice is also seen as a potential climate solution in the investment space. Monitoring technology has improved the capacity to quantify production benefits and emissions reductions from changes in techniques. This has created potential for **results-based financing**, which some capital providers on the call noted was an area of growing interest for their funds. That said, other co-benefits, like air quality, human health, and freshwater savings, remain unquantified, which acts as a barrier to attracting more investment. The potential for a carbon credit linked to rice production was also raised.

Several speakers from both the public and private sector highlighted **the role of PPPs in scaling sustainable rice**. While development finance and the public agricultural extension services infrastructure are able to provide some relevant inputs and technical assistance to smallholders, the private sector was also required for these inputs to be provided at scale. It was argued that PPPs could help to facilitate this scaling. Further, commercial

banks require PPPs for financing to enable their initial investments to reach the de-risking requirements imposed by central banks. Blended finance is important here, to help overcome initial risk barriers that prevent the crowding in of private capital. To address these challenges, the Vietnamese government set up the Public-Private Partnerships Taskforce on Rice in 2017, which is already running a number of pilot projects in the Mekong and Red River Deltas.

The public sector also has a role in creating a suitable enabling environment in Vietnam. The operating environment was a key concern for those looking to roll out supply chain financing. In order to promote equitable value chains, the rice market in Vietnam will have to move from spot market to one based in productive long-term producer relationships through contract farming. However, there are many practical barriers to contract farming in Vietnam: Side-selling is a major concern that holds up pre-financing, and a lack of legal instruments make it hard to enforce contracts. The rule of law for inside-gate financing must be better applied for pre-financing and contract farming to reach levels seen in mature markets. Other suggestions for the enabling environment included: a simplified administration process for financing rice in Vietnam; allowing less conventional financing sources like microfinance to crowd into capital markets; and the digitization of land data and credit histories.

The **need for technical assistance** was underlined. Several off-takers described issues with exporting rice due to the overuse of fertilizers and pesticides, leaving residues on crops above MRLs and thus making them unsuitable for export. Schemes working at the farm level providing this technical assistance have had success: One off-taker noted that through a PPP with the Vietnamese government, they were able to successfully train farmers in how to apply pesticides to be safe for export. However, there was recognition that **this technical assistance needs scaling**.

Increasing farm-level capacity through infrastructure investments is also needed across Vietnam. Investing in post-harvesting mechanization for drying, as well as storage infrastructure, was highlighted as a priority. This has been an acute need post-pandemic, where prohibitive export costs have increased the need for storing grain. Drip irrigation for rice production in Vietnam is another technique raised. Despite water savings of 60-70 percent compared to rice paddies, and with minimal methane production, drip irrigation remains underused by smallholders due to its expense, with a drip irrigation system costing USD 3 000 - 5 000 per hectare to install. Two potential funding methods were suggested: a government subsidy, as is used in Turkey and India; or financing through off-takers, who would be repaid either with rice or profits from rice. Agricultural technology was noted as a key priority by one funder.

Despite agreement on the importance of ensuring that financing (and financial incentives) reaches smallholders, **it was agreed amongst funders that direct smallholder financing was not feasible**. DFIs, banks, and other funders present noted that minimum ticket sizes (which ranged between USD 1 million and USD 25 million) prohibited direct investment in small or even mid-sized rice operations. A more attractive route for capital providers is to channel finance through off-takers, processors or distribution companies, some of whom have outgrower programmes through which to channel finance. One capital provider also mentioned the possibility to finance through state-owned enterprises.

Finally, it was underlined that **no one actor can fund sustainable rice alone**. One funder expressed that the ideal funding situation would involve off-takers being present as an intermediary for finance, DFIs and international financial institutions providing blended finance, and ring-fencing by governments to allow the establishment of contract farming agreements without side-selling.

Appendix D: Summary – West Africa roundtable

Financing sustainable rice in West Africa: A roundtable discussion

Held on 16 September 2021. Hosted by the Sustainable Rice Landscapes Initiative (a consortium of WBCSD, SRP, FAO, GIZ, UNEP and IRRI) and the Just Rural Transition.

Contributors
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Zainab Ibrahim, NIRSAL
Ibrahim Gourouza, NEPAD / Grow Africa
Khaoula Jaoui, OSS
Roel Messie, IDH FarmFit
Eren Kelecki, AfDB
Matthew Reddy, GEF
Jane Feehan, EIB
Watipaso Mkandawire, UK FCDO
Shahid Parwez, GCF
Rafael Flor, BMGF

Moderator
Soumaila Diakite, Clarmondial AG

Executive summary

- **Consumption of rice in West Africa is growing faster than anywhere else in the world**. Meeting this growing demand with locally produced rice is a way for the region to increase its food security and self-reliance, and offers an opportunity for public- and private-sector capital providers to contribute to environmental, nutrition and inequality goals.

- **Finance is needed to increase productivity, with yields in the region at around half the global average, and to strengthen the value chain more broadly**. Providing farmers with access to inputs, building irrigation infrastructure and improving processing and distribution are all needed, providing investment opportunities.

- **A wide range of stakeholders have roles to play in scaling sustainable rice in West Africa**. Different types of finance, from microfinance to large-scale debt, equity and hybrid instruments, are all needed, with the private sector playing an important role in strengthening the sector, and a supportive and clear policy environment essential.

- **Innovative partnerships can overcome some of the specific challenges of the sector**. For example: using catalytic capital to take high-risk positions in long-term investments can overcome a disconnect between the perceived risks and the risk tolerance of capital providers; technical assistance can help overcome market fragmentation and coordination challenges; and new forms of brokering can identify and give visibility to bankable rice finance projects.

- **Increasing finance absorptivity is essential.** In particular capital providers struggle to identify bankable projects, and better aggregation is needed to overcome a mismatch between small-scale finance needs of farmers and the large minimum ticket sizes of many finance mechanisms.

Summary of discussion

The following roundtable discussion, organized by the Sustainable Rice Landscapes Initiative (SRLI), discussed the challenges and opportunities surrounding sustainable rice in West Africa. It brought together public and private actors involved on the ground in West Africa with capital providers from development banks, DFIs and private capital.

After an introduction from the moderator (Soumaila Diakite, Clarmondial AG), Christine Negra framed the context of the roundtable. Moving to more sustainable forms of rice production offers valuable opportunities to address a number of environmental and societal goals. Financing the investments needed to unlock this value has been challenging, with multiple barriers leading to significant financing gaps in West Africa. However, by co-developing innovative partnerships, there is potential to scale the finance needed. Specifically, solutions must be tailored to the region and create value for all stakeholders (including farmers, who are often financially excluded). Challenges remain in relation to trust and side-selling, which make pre-financing for smallholders difficult. There is also a need for technical assistance and capacity building across the supply chain.

The roundtable continued with inputs from private- and public-sector actors on the challenges and opportunities for sustainable rice in West Africa, followed by reactions from capital providers. Reactions from capital providers are in purple.

West Africa is seeing huge growth in both production and consumption of rice: While around 90 percent of the world's rice is produced and consumed in the Asia-Pacific region, the highest consumption *growth* rates in the world are in West Africa. Meeting this growing demand with locally produced rice is a way for the region to increase its food security and self-reliance, and more broadly to work towards the Sustainable Development Goals. Funders highlighted that support for sustainable rice projects is a way to meet goals focused on climate adaptation and mitigation (given rice's significant greenhouse gas emissions and water footprint), nutrition and inequality.

Rice production in West Africa is characterized by low productivity: Rice yields in Nigeria and West Africa are famously low, around half the global average. Despite recent increases in productivity, this continues to pose particular problems for farmers, who would struggle to make a living wage from rice alone, and must compete with rice imports from areas with higher productivity, such as Vietnam.

Finance is needed to increase productivity, while building in sustainability goals. Finance needs can be broken down into upstream and downstream elements:

Upstream, farmers often find it hard to secure finance for inputs. Also, research and development is needed on varieties most suited for the local environmental context and tastes. With only 11 percent of rice production irrigated, **large-scale investment is needed in irrigation and other infrastructure (including digital)**. However, **this must be complemented by capacity building**, including extension services and sharing information, for example by linking research centres with both small-scale rice farmers and private sector companies to build knowledge about sustainable rice production. Areas like water accounting systems and support to SMEs are critical, but often overlooked, with sustainable rice projects often focusing on production itself.

Downstream, many mills exist across the region, but the **millers need working capital, as well as capacity building** to improve rice quality and satisfy the growing market for rice. In addition further support is needed for the micro-market ecosystem, and across the rice value chain more broadly, including

processing (such as parboiling, which increases profitability), storage and distribution, and preventing food loss and waste.

Given these different needs, **multiple types of finance are used** for rice in West Africa, with participants describing a range of approaches: from microfinance and businesses providing loans to the farmers in their supply chains, to debt, equity and hybrid instruments providing large-scale finance, and sovereign loans for government programmes.

As interest around West African sustainable rice continues to grow, a number of specific challenges must be overcome in order to expand financing to the scale required.

- Increasing finance absorptivity is key. Specifically, **there is a lack of readily bankable projects**, meaning project development and preparation is often needed, either prior to or alongside investment.

- **The landscape is highly fragmented, yet funders are generally looking for large-scale investments**, with a number of participants citing their minimum investment size as being in the tens of millions of dollars. Better aggregation could help overcome this mismatch; by organizing into cooperatives, smallholders are better placed to attract finance as discoverable, bankable units that can act as financial entities, for example responding to forward contracts.

- Investing in rice in West Africa is **characterized by uncertainties**, and both counterparties and providers of capital consider the risks to be high, **calling for innovative forms of de-risking** that can overcome the disconnect between the risk acceptance of capital providers and the risks associated with, for example, small-scale finance.

- **There is a lack of coordination at multiple levels**: from market coordination to ensure that rice moves to areas where there is demand for it, to coordination across initiatives and between donors in-country, to regional-level initiatives.

Overcoming these specific challenges requires that **different actors each play a role, working together to co-create tailored solutions that are innovative, flexible and meet the needs of the specific users**.

In particular the **private sector has an essential role** to play in driving the development of the rice sector in West Africa, providing incentives and rewards to farmers to transition towards more sustainable forms of production, providing capital for e.g. processing, and in ensuring that the rice product is translated into a desirable consumer good.

Given the specific challenges, **this requires innovative partnerships and approaches to de-risking**, for example using catalytic capital to take high risk positions in long-term investments, providing technical assistance to overcome market fragmentation and coordination challenges, and providing brokering that gives visibility to bankable rice finance projects. Projects such as the Africa Food, Trade and Resilience Programme show promise in this regard.

Finally, **a supportive policy environment, with clarity around regulations, tariffs and duties, is needed** in order to enable rice finance to scale. While domestic policy is generally supportive of investments in rice, there is always pressure from other domestic priorities. Examples of policies with good potential include national guarantee schemes, backed by donor support, which can improve the bankability of rice farmers, and ministerial portfolios focused on rice, such as in Côte d'Ivoire. At the regional level, the ECOWAS Rice Offensive Programme and Rice Observatory have an important role, enabling further investment from funders.[109]

[109] The Observatory provides governance of the rice value chain, increasing predictability and ensuring that rice value chains contribute to climate, nutrition and sustainable development goals.

Appendix E: Summary – Thailand roundtable

Financing sustainable rice in Thailand: A roundtable discussion

Held on 23 September 2021. Hosted by the Sustainable Rice Landscapes Initiative (a consortium of WBCSD, SRP, FAO, GIZ, UNEP and IRRI).

Contributors
Dr. Apichart Pongsrihadulchai, Thai Rice Department
Narawadee Modenuch, OLAM
Dr. Anja Erlbeck, GIZ
Ryan Thew, Aus DFAT
Marc Dumas-Johansen, GCF
Kathryn Jarvis, ADB
Ahmed Eiweida, IFC
Shilpa Gulrajani, BNPP

Moderator
Sarida Khananusit, project director for mainstreaming sustainable rice at GIZ Thailand

Executive summary

- **Rice is both contributing to climate change and threatened by its impacts**. There is an opportunity for reducing GHG emissions, e.g. through AWD and recycling of rice residual products, and a need for adaption, as demonstrated by the recent drought.
- **Tangible economic benefits for farmers are key for a transition to sustainable agriculture**. Farmers are highly risk-averse and reluctant to invest in innovative or new technologies.
- **Involvement of private-sector players in extension services** and introduction of sustainable farming practices is key.
- **Tailored financial instruments can support the initial uptake and transition to sustainable rice farming**. A combination of credit and partial grants or subsidies can overcome persistent financial barriers. First experiences exist in the country already, e.g. from the Thai Rice Nationally Appropriate Mitigation Action (NAMA) revolving fund.

Summary of discussion

The roundtable discussion on Sustainable Rice Financing in Thailand, organized by the Sustainable Rice Landscapes Initiative (SRLI), discussed the challenges and opportunities surrounding sustainable rice and climate change. It brought together input from

public and private actors involved, including from key sectoral departments of the Royal Thai Government, as well as major private-sector players like OLAM and development organizations like GIZ, and international donors including the Green Climate Fund, the Asian Development Bank and BNP Paribas.

The session was introduced by Victoria Crawford (WBCSD) and Anja Erlbeck (GIZ Thailand) who framed the event and outlined the goals of the session: bringing together stakeholders from across the finance and agricultural value chain to explore the specific context for financing sustainable rice in Thailand and identifying promising next steps and opportunities.

The roundtable continued with inputs from private- and public-sector actors on the challenges and opportunities for sustainable rice in Thailand, followed by reactions from capital providers. Reactions from capital providers are in purple.

Rice is the single most important crop in Thailand. The majority of rice grown is in rainfed lowland areas, with irrigated rice amounting to roughly one-fifth of the total planting area. The **Thai government is promoting a number of climate-smart practices** and is actively capacitating farmers on techniques that mitigate GHG emissions, notably AWD in combination with laser land levelling. A key requirement for farmer uptake of sustainable cultivation practices is always a **tangible economic benefit** in the eye of the farmer – this is why a **holistic approach** is necessary. This benefit needs to be communicated. Still, large **financial barriers persist, and farmers are reluctant to invest in technologies perceived as high-risk**. The government aims to address these barriers through a number of incentive schemes for providers of laser-levelling services, and soft loans for farmers.

Such barriers further need to be addressed through **tailored financial instruments and TA support on access to finance. An example is the Thai Rice NAMA revolving fund**. Partial grants or subsidies that incentivize the uptake of certain practices can help to introduce innovative climate-smart farming techniques and support the development of market mechanisms. At the same time, **climate change is already a threat to farmers: The severe drought** that Thailand experienced in recent years has led to significant losses in the agricultural sector and hampers investment.

The importance of **reducing the burning of rice straw and stubble** was noted. Participants suggested to facilitate the development of a market for rice residue, which might generate additional income for farmers, or exploring alternative uses of residues like tilling into the soil, which could have positive impact on yields.

Introducing sustainable and climate-smart rice production techniques requires a strong involvement of the private sector, including an involvement in extension services and capacity building for farmers. It should be noted that **sustainable agricultural techniques, e.g. under the SRP, can result in substantial economic co-benefits for farmers**, both through increased yields and through reduced pesticide and/or fertilizer usage. There are clear provisions in the SRP Standard that aim to reduce the application of such agrochemicals. It was noted that demand for sustainable rice is expected to increase and could be a key driver for the uptake of such practices by producers. Still, there is a large **gap** in the financing required for the transition, which will require both public and private investments to fill, e.g. through **blending** of such capital. Here, the opportunity of carbon credits was also raised.

Appendix F: Summary – Pakistan roundtable

Financing sustainable rice in Pakistan: A roundtable discussion

Held on 28 September 2021. Hosted by the Sustainable Rice Landscapes Initiative (a consortium of WBCSD, SRP, FAO, GIZ, UNEP and IRRI) and the Just Rural Transition.

Contributors
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Tauseef Ul Haq, Syngenta Pakistan
Adnan Pasha, HBL
Wilmar Restropo, Axfood-Dagab
Tanja Havemann, Clarmondial
Christine Negra, Versant Vision
Noor Ullah, ADB
Bas Rekvelt, FMO
Semi Khan, CDC
Gaëtan Herinckx, Belgian Investment Office
Klas Svensson, SIDA

Moderator
Tanja Havemann, Co-founder and Director, Clarmondial

Executive summary

- **Positive results from sustainable rice trainings in Pakistan**. Contributors shared their experience implementing the Sustainable Rice Platform (SRP) standard in Pakistan through farmer support systems such as extension and training. Farmers have increased their productivity and profit through sustainable practices and mechanization.

- **Finance remains a barrier for farmers**. Farmers are eager to adopt new technologies but lack access to finance for capital investments. Many farmers are going through middlemen, where they borrow at higher interest than market rates. Banks can also have high interest rates. For financial institutions, lending to farmers is risky. There is a need to de-risk investment into agriculture.

- **Combining support services for farmers is an effective intervention**. Several contributors noted that combining extension or training with access to finance were beneficial to promote adoption of sustainable practices. Contributors also noted that in-kind loans (such as inputs) were beneficial and can reduce risk.

- **There is a need for investment in mechanization and farmer training**. Mechanization and technology adoption alone are not sufficient; farmers need education and training about sustainable rice practices.

- **There are investment opportunities along the value chain: farm to fork**. Rice millers, processers, and warehousers are also important sites for investment.

- **Specialty rice (basmati) has high demand, but financial challenges remain**. Sustainable basmati rice is an exciting market opportunity due to the built-in demand for specialty rice, but profits can be challenged by high input costs and uncertain crop prices.

- **There is high interest in blended finance in Pakistan**. Blended finance was a significant buzzword for financers at the workshop, and could be well suited to Pakistan due to the availability of private-sector investment along the rice value chain.

Summary of discussion

The following roundtable discussion, organized by the Sustainable Rice Landscapes Initiative (SRLI), discussed the challenges and opportunities surrounding sustainable rice in Pakistan. It brought together public and private actors involved on the ground in Pakistan with capital providers from development banks, DFIs and private capital.

Tanja Havemann framed the context of the roundtable. Moving to more sustainable forms of rice production offers valuable opportunities to address a number of environmental and societal goals. Financing the investments needed to unlock this value has been challenging, with multiple barriers leading to significant financing gaps in Pakistan. However, there is potential to scale the finance needed by co-developing innovative partnerships. Specifically, solutions must be tailored to the region and create value for all stakeholders (including farmers, who are often financially excluded). Challenges remain in relation to trust and side-selling, which make pre-financing for smallholders difficult. There is also a need for technical assistance and capacity building across the supply chain.

The roundtable continued with inputs from private- and public-sector actors on the challenges and opportunities for sustainable rice in Pakistan, followed by reactions from capital providers. Reactions from capital providers are in purple.

Rice is a key crop in Pakistan, for both the export market and for smallholder livelihoods. Workshop contributors shared their experiences **implementing Sustainable Rice Platform (SRP) standards** in Pakistan. Training and targeted agronomic support were sometimes coupled with in-kind loans (such as agricultural inputs) and access to other finance. In-kind loans in the form of agricultural inputs reduces the risk for the lender from uncertainty over how the farmer spends the loan. Some farmers were provided with a digital smart card, allowing them access to benefits from different vendors and banks.

Farmer **education and training are needed** for farmers to understand and learn sustainable rice practices. The trend towards mechanization will improve productivity, but farmers lack **access to finance** for capital investments. There is substantial private-sector interest in improving productivity of rice through **mechanization** in Pakistan. For small farmers, equipment can be rented. Farmers need long-term support to de-risk the adoption of new technologies and reduce uncertainty.

In Pakistan, basmati rice is in high demand for export. A current issue is **reducing pesticide residue for export**, to meet European and other standards. Retailers want sustainable rice and there are some pilot projects giving a premium price for SRP rice, but the price premium may be temporary.

A current barrier to rice sustainability is the role of the middlemen in rice markets, as well as high input costs and uncertain crop prices. Several contributors noted the **need**

to reduce the role of the middlemen, and to ensure that farmers get quality inputs and fair prices. An alternative model around rice millers was discussed. **Rice millers and processors could be supported in a cluster model**: with each miller working with many farmers. These clusters can be connected to extension and input providers for a local ecosystem that de-risks funding or finance.

The issue of **societal and economic inclusiveness** came up repeatedly, including working with smallholder farmers. Blended finance can be used to benefit smallholders. Financial inclusion was discussed several times, as was the need to reach unbanked farmers and groups not traditionally served by agricultural credit. This can improve food security and reduce inequality. Grower organizations and societal mobilization are effective ways to increase smallholder capacity and women's economic empowerment.

In terms of finance modes, the workshop participants shared their experience ranging **from public to private finance**. Different organizations are able to take on different risks, with public finance tending to take on more risk and over longer time periods. But there is a **trend towards impact investing and venture capital**, investing in early-stage technology and innovation. Blended finance can be used for projects with climate adaptation and mitigation aspects. **Blended finance allows sharing of risk and reaching development targets**. In Pakistan, the issue is not so much liquidity but the level of risk that local banks are willing to take. And ultimately, the financial instrument must have value to the farmer, being the appropriate amount and at the right time.

Finally, several contributors noted the need to invest in key enablers in the value chain, e.g. farmer mechanization, millers, and warehousing.

Appendix G: Summary – India roundtable

Financing sustainable rice in India: A roundtable discussion

Held on 29 September 2021. Hosted by the Sustainable Rice Landscapes Initiative (a consortium of WBCSD, SRP, FAO, GIZ, UNEP and IRRI) and the Just Rural Transition.

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Amit Trikha, Bayer
Arindom Datta, RaboBank
Hari Rajagopal, Samunnati
Prateek Kala, Yes Bank
Aashish Bansal, Axis Bank
Sami Khan, CDC
Janavi Papriwal, Aavishkaar Capital
Tushna Dora, ADB
Joke Oudelaar, Rabobank
Kundan Singh, FAO
Oresan Pahladsingh, FMO

Moderator
Marci Baranski, international rice manager, UNEP

Executive summary

- **Funders see significant opportunities for sustainable agriculture and climate finance in the rice value chain**. DFIs are keen to enter or further increase investments in the rice value chain, with the dual objective of promoting climate resilience and improving rural livelihoods. Several financial products available in the country are applicable and can be easily adapted to the rice sector.

- **Scaling up finance is essential for sustainable rice production in India**. Innovative financing is needed to generate awareness, provide capacity building, and grant access to farmers on good agricultural practices and technologies that will lead to the decrease of their water and carbon footprint in rice production.

- **There is strong potential for the integration of digital technology with farmer financing in India**. The rise of digital transformation in India brings a lot of opportunities to introduce fintech to smallholder rice farmers and develop digital technology platforms linked to farmer financing.

- **DFIs utilize the farm-to-fork approach and collaborate with SMEs to provide support across the value chain**. Capital providers work with various companies from large-scale producers to retail manufacturers to be able to address the banking needs of the sector, mostly through blended finance. A particular focus is on leveraging those that have direct linkages to farmer communities to enable both direct and indirect impact.

- **Rice straw burning is a key climate issue in India that funders could explore for financing opportunities**. Rice straw residue opens up a number of opportunities for alternative supply chains and income streams for smallholder farmers which would reduce rice straw burning and GHG emissions. Financing requirements on this opportunity could be explored, particularly for small and micro entrepreneurs.

- **Funders are encouraged to also explore the feasibility of sustainable standards serving as a de-risking mechanism for financial services they offer**. Linking sustainable standards to financial services can contribute significantly to reaching critical mass for the sustainable rice platform and practices to move forward and be fully adopted in India.

Summary of discussion

The following roundtable discussion, organized by the Sustainable Rice Landscapes Initiative (SRLI), discussed the challenges and opportunities surrounding sustainable rice in India. It brought together public and private actors involved on the ground in India with capital providers from development banks, DFIs and private capital.

After an introduction from the moderator (Marci Baranski, UNEP), Harsh Vivek (IFC) framed the context of the roundtable. Moving to more sustainable forms of rice production offers valuable opportunities to address a number of environmental and societal goals. Financing the investments needed to unlock this value has been challenging, with multiple barriers leading to significant financing gaps in India. However, by co-developing innovative partnerships, there is potential to scale the finance needed. Specifically, solutions must be tailored to the region and create value for all stakeholders (including farmers, who are often financially excluded). Challenges remain in relation to trust and side-selling, which make pre-financing for smallholders difficult. There is also a need for technical assistance and capacity-building across the supply chain.

The roundtable continued with inputs from private- and public-sector actors on the challenges and opportunities for sustainable rice in India, followed by reactions from capital providers. Reactions from capital providers are in purple.

Climate change mitigation and adaptation is a key driver for financing investments in the sector. Several funders aim to promote climate smart agriculture by way of incentivizing and putting more investments into the shift away from inefficient and polluting agronomic practices to climate-friendly ones. This is very much aligned with private-sector and NGO partners who are working with farmer communities to increase climate resilience and implement sustainable practices in the rice value chain. Water-saving and climate-friendly rice practices and technologies such as AWD, direct-seeded rice, site-specific nutrient management and integrated pest management are being strongly promoted in their off-taker and outreach programmes. In addition to increasing climate resilience, these initiatives also directly impact farmers, given that it improves their income and livelihoods.

Most funders have noted the growing market for digital technology and its potential to facilitate farmer financing. One funder emphasized the importance of digital platforms in rural financing as they provide financing institutions with critical data about smallholder farmers (i.e. farmer produce, land, soil condition, etc.) in a cost-efficient manner and also allow for more efficient monitoring. As an example, another funder explained about their partner who provides agricultural inputs to farmers through a web and mobile application. This platform has an added feature where farmers can interact with one another and exchange views on agricultural practices. These kinds of applications lead to increased access to farmer data which result in a lot more fintech players becoming active in the sector, and further unlocking of capital from mainstream financial institutions.

The use of blended finance in the agriculture sector has also increasingly become popular among DFIs and has been well linked to farmer digitization. Some funders highlighted

recently launching various blended facilities related to regenerative and climate-smart agriculture as a response to COVID-19. Many of these transactions are in India and are directly or indirectly exposed to the rice value chain. Most of these large-scale investments are offered to retail finance institutions such as commercial banks, private sector enterprises, or start-ups which have direct linkages to farmer communities. They can then use this additional financing as a risk mitigation measure when working with farmer organizations, cooperatives, or other smaller rice value chain actors.

A number of financial products offered are packaged with technical assistance facilities to support farmers in gaining awareness, training, and access to climate-friendly and sustainable agricultural practices and technologies. One funder shared that they offer financial services while also providing market linkages, recognizing that the key root of financial exclusion is market exclusion. The capital provider offers financing while at the same time connecting farmer and producer organizations to agriculture traders and processors.

Some private-sector partners underlined that, despite the presence of DFIs and availability of agriculture financial products, **financing sustainable rice production has yet to pick up pace in the country**. Some funders have also mentioned that they have yet to include rice in their current agriculture portfolio. However, **they see many of their current financial products and services applicable or adaptable to rice and are keen to increase investments in the sector**.

Rice straw burning is a major barrier to sustainable rice production in India given its contribution to GHG emissions. One private-sector partner mentioned **the potential for alternative supply chains and entrepreneurship opportunities for rice straw management through identifying positive uses or products for rice straw residue**.

Ex situ extraction can lead to the development of animal feed, compressed biogas, or other products that would equate to alternative income streams for smallholder farmers. Financing is then needed to be able to provide capital to these micro and small entrepreneur-farmers. **But a much deeper conversation needs to be had around identifying the financing opportunity and business model for these rice straw residue products, and putting a framework and ecosystem in place to ensure they become sustainable**.

Lastly, the opportunity to develop a sustainable rice platform (SRP) in India was also brought up. Many countries in South-East Asia and Africa have already started developing their own chapter, with various stakeholders in the private and public sector coming together to identify sustainable rice production standards to be adopted in their own countries. **The question was then put to DFIs whether it is feasible to provide financing to farmers as a way to incentivize them to follow SRP standards**.

It was admitted that being able to gather proof on the ground that Indian farmers are employing sustainable agricultural practices and following international standards is currently a work in progress and may take time. **However, once a system is in place for data collection, funders are encouraged to think through how incentives can be built into financial structures to reward farmers for their good behaviour, especially as it reduces their likelihood of default and crop failure**. Compliance with these sustainable standards may serve as a de-risking mechanism for financial services such as micro credit or crop insurance, and these may be explored.

About SRLI
The Sustainable Rice Landscapes Initiative (SRLI) is a consortium of six partners working together to meet the growing global demand for sustainable rice:

- The Food and Agriculture Organization of the United Nations (FAO)
- Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)
- The International Rice Research Institute (IRRI)
- The Sustainable Rice Platform (SRP)
- UN Environment Programme (UNEP)
- The World Business Council for Sustainable Development (WBCSD).

Together, these partners have extensive networks across the public, private and civil society and research spaces, positioning them ideally to drive progress on sustainable rice. Working closely with governments, GEF and a range of partners, SRLI has mobilized more than USD $50m in 8 countries, with more than $650m in co-financing, for landscape and related sustainable rice projects across Asia. SRLI recognizes that this involves transforming rice-based production landscapes through multi-stakeholder action, and is designed to attract resources, mainstream best practices and innovative technologies, and connect farmers to markets.

About WBCSD
WBCSD is the premier global, CEO-led community of over 200 of the world's leading sustainable businesses working collectively to accelerate the system transformations needed for a net zero, nature positive, and more equitable future.

We do this by engaging executives and sustainability leaders from business and elsewhere to share practical insights on the obstacles and opportunities we currently face in tackling the integrated climate, nature and inequality sustainability challenge; by co-developing "how-to" CEO-guides from these insights; by providing science-based target guidance including standards and protocols; and by developing tools and platforms to help leading businesses in sustainability drive integrated actions to tackle climate, nature and inequality challenges across sectors and geographical regions.

Together, we are the leading voice of business for sustainability, united by our vision of creating a world in which 9+ billion people are living well, within planetary boundaries, by mid-century.

www.wbcsd.org

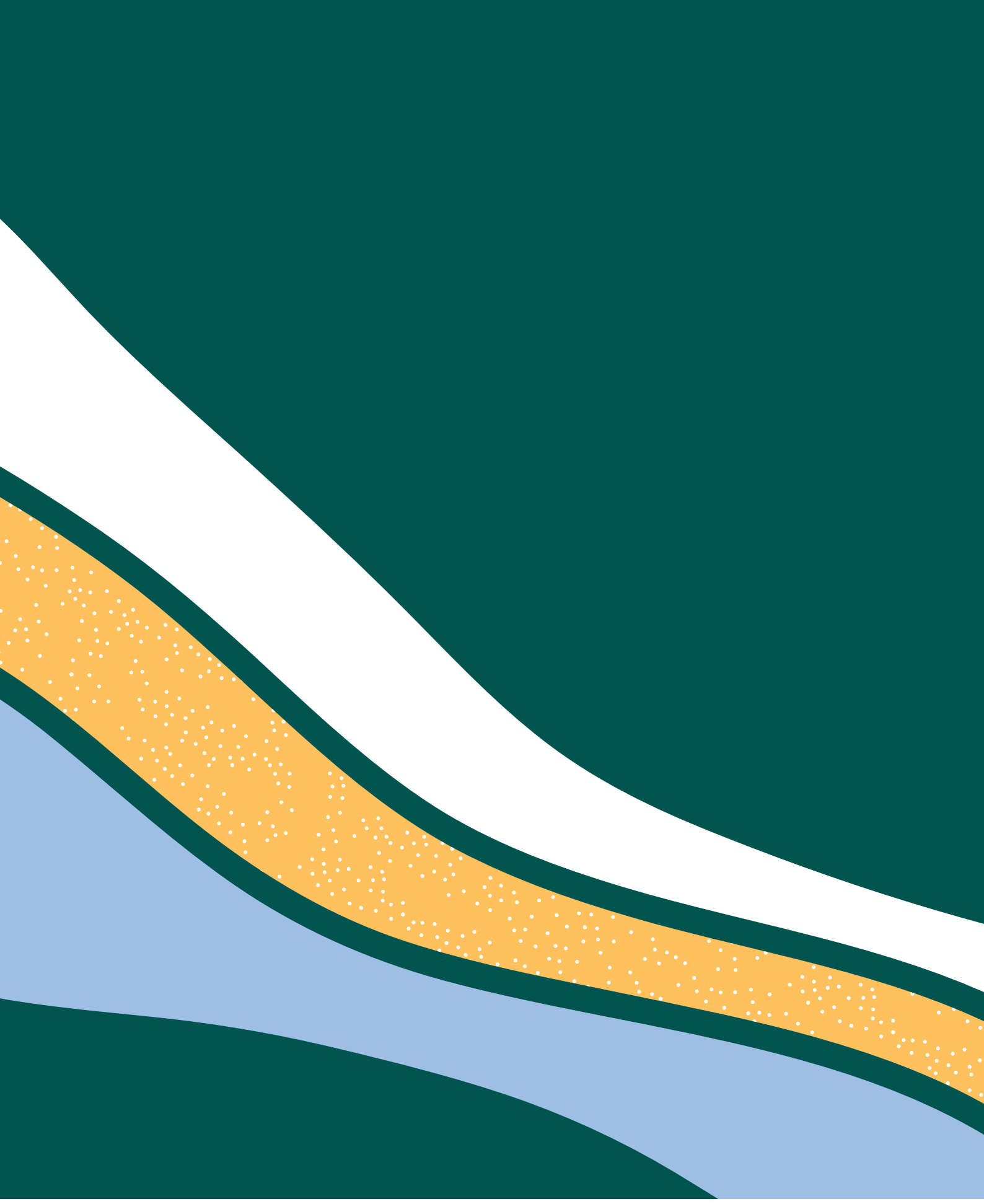
About SRP
The Sustainable Rice Platform e.V. (SRP) is a global multi-stakeholder alliance comprising over 100 institutional members from the public, private, research, civil society and the financial sector. SRP is registered as a not-for-profit member association working to transform the global rice sector by improving smallholder livelihoods, reducing the social, environmental and climate footprint of rice production, and by offering the global rice market an assured supply of sustainably produced rice. In 2015 SRP introduced the world's first voluntary standard and indicators for sustainable rice farming, dedicated to the needs of smallholders. The SRP Standard stands at the core of a number of GEF-funded projects proposed under the Sustainable Rice Landscapes Initiative in South and Southeast Asia and provides the basis for a robust reporting framework for financial instruments to drive sectoral transformation.

www.sustainablerice.org

About JRT
The Just Rural Transition initiative (JRT) brings together food producers, governments, businesses, investors, civil society, rural and indigenous peoples to champion people-centred solutions to food systems challenges. They aim to transform food systems by catalysing policy reform, encouraging investment partnerships, and mainstreaming food, land use, justice, equity, and rural livelihoods at the centre of efforts to realize sustainable development goals and the Paris Agreement.

JRT is a partnership of Meridian Institute and the World Business Council on Sustainable Development (WBCSD) with funding from the UK Department of Foreign, Commonwealth and Development Office and ClimateWorks Foundation.

www.justruraltransition.org



Just Rural Transition

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Sustainable Rice Platform

SRP

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