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Information Note

Regional Rice Strategy for Asia and the Pacific

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I. Introduction

1. The 31st Session of the FAO Regional Conference for Asia and the Pacific (APRC), held in Hanoi in March 2012, called upon FAO to coordinate the development of a rice strategy for the region. This call was made against the backdrop of the food crisis of 2007/08 and increased attention to the development of the rice sector by national governments and international agencies.

2. A single regional rice strategy cannot capture the diversity that exists in rice production systems and policy priorities across countries in this large and diverse region. Therefore, rice strategies and policies should be country-specific. However, national strategy is best formulated when guided by insights and parameters identified within the framework of regional and global assessments of the situation. This is important in view of the increasing linkages among factors affecting the rice sector, the economy and national and regional food security.

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3. The main aim of the strategy document is to provide evidence-based strategic guidelines to member nations to help them: (a) develop/adjust their rice sector strategies in light of broader regional/global trends and national priorities; and (b) choose among key strategic options while considering the implied trade-offs or consequences. Rather than being prescriptive, the outputs are presented in the form of strategic options with implied trade-offs or consequences. The intent is to enrich the strategy and policy formulation processes of member nations for achieving sustainable food security.

4. A working group was formed for this purpose and an advisory group of eminent experts was constituted. The Expert Rice Advisory Group (ERAG) met twice to provide advice to the working group involved in the preparation of the rice strategy.

II. Challenges and opportunities in regional rice sector development

5. Rice is the food staple of Asia and is central to the food security of about half of the world's population. Asia accounts for over 90 percent of the world's rice production and consumption. Rice production is an important source of livelihoods for around 140 million rice-farming households and for millions of rural poor people who work on rice farms as hired labour. It is a strategic commodity because the overall economic growth and political stability of the region depends on an adequate, cheap and stable supply of this staple crop.

6. Despite the substantial increase in rice production in the wake of the Green Revolution, important challenges remain to ensure an adequate and stable supply of this important commodity cheaply to poor consumers. Major challenges include: the need to produce more rice to meet the rising demand driven by population growth; deceleration in the growth of rice yields; environmental degradation associated with intensive rice production; decline of rice biodiversity and loss of rice heritage; global climate change; increasing competition for land, labour and water from industrial and urban sectors; changes in dietary composition with income growth and urbanization; and changes in the demographic composition of labour in rural areas. Also, achieving stable rice prices is challenging when faced with the transmission of shocks resulting from the increased interconnectedness of rice with other sectors and instability in the trade policies of major exporting countries.

7. Despite these challenges, there are several new opportunities to increase the impact of the rice sector in enhancing food security and reducing hunger and poverty. Modern scientific approaches and new technologies are making it possible to increase rice productivity in a sustainable manner, add nutritive value to rice, reduce losses from drought and flood, reduce the environmental footprint of rice production and make the rice production system "climate smart". Similarly, new opportunities are now available for enhancing rice value chains, reducing post-harvest losses, adding value through secondary processing and ensuring higher quality and safety of rice and rice products. Regional networks to share rice technology and market information are being established to raise productivity and stabilize market supply through improved trading arrangements.

8. Overall, the major strategic issues for the region now are how to modernize and transform the rice sector, given the various challenges. Asian economies are transforming, and there are opportunities as well as a clear need for the rice sector to transform itself. Rather than taking a business-as-usual approach, forward-looking and innovative solutions must be found for a major strategic reorientation of the rice sector.

III. A vision for the rice sector

9. Given the challenges and opportunities, a vision statement is needed to guide the strategic reorientation of the rice sector. The proposed vision for the rice sector is: *"food-secure, better nourished and prosperous rice producers and consumers in the Asia/Pacific region who benefit equitably from a vibrant, innovative and transformed rice sector that is more productive, efficient and environmentally sustainable by 2030"*.

10. Implicit in this vision statement is Asia's role in improving world food security because Asia is a net exporting region which accounts for 70 percent of the world's rice exports. The traded volume

of rice is small and accounts for only about 7 percent of the world's total consumption. Nevertheless, trade plays an important role in enhancing the food security of importing countries. As Africa is currently a major destination for Asian rice exports, the food security of Africa – at least in the near term – will depend on Asia's ability to maintain its exportable surplus, although production within Africa is likely to increase over time.

IV. Global rice demand and trade outlook

11. Various outlooks for 2030 indicate that the global demand for rice will be in the range of 503-544 million metric tonnes. This is equivalent to an average growth rate of approximately 1 percent per year relative to the total consumption in 2010 of 439 million tonnes. This demand growth is driven mainly by a growth in population, although it is also influenced by changing consumption patterns. Asian rice consumption is projected to account for close to two-thirds of this total increase in demand by 2030.

12. Additional demand for Asian rice production will come from export markets. An increase of 5-7 million tonnes is projected for rice exports from Asia between 2013 and 2022, and an additional 2-3 million tonnes are projected to be imported by Africa. Overall, the world rice trade in 2022 is estimated to be about 46 million tonnes, which represents an expansion of about 8-9 million tonnes over 2013.

13. This outlook highlights the need to intensify rice production in Asia to meet the rising demand, as the possibility of expanding the area is limited. The projected yield growth required for meeting the increasing demand is 1.2-1.5 percent per year, taking into account the likely future reductions in rice area arising from competition for land from other uses. This projected growth rate is higher than the growth rate of rice yields in the late 1990s and early 2000s.

V. Strategic objectives

14. In the context of the outlook described above, the following six strategic objectives are derived from the proposed vision:

Objective 1: Increase the productivity and nutrition value of rice sustainably to meet the increasing global demand (**Increase productivity, nutrition value and sustainability**).

Objective 2: Enhance the rice value chain by improving food quality, diversity and food safety while reducing the post-harvest losses (**Enhance value chain and reduce post-harvest losses**).

Objective 3: Improve mitigation/adaptation of rice farming to climate change, and improve farmers' capacity to cope with risk (**Mitigate/Adapt to climate change and reduce risk**).

Objective 4: Minimize the environmental footprint of rice production and enhance the ecosystems functions of rice landscapes, including the protection/promotion of rice heritage and culture (**Conserve environment and heritage**).

Objective 5: Improve the efficiency, reliability and fairness of domestic and international rice markets for stabilizing rice price and supply, ensuring equitable access by the poor and promoting regional collaboration (**Promote fair and efficient market and trade**).

Objective 6: Enhance the well-being and livelihoods of smallholders, women and a new generation of rice producers by improving adjustments to long-term changes in demography, farm size and labour supply (**Improve organization of production and empower women**).

15. These six strategic objectives are not independent of each other; there are linkages that result in complementarities and trade-offs. This is especially the case with Objective 6 regarding adjustments in the organization of production. Adjustments will affect technology adoption, input use and the nature of the value chain, which in turn will affect the pace of change. The overall aim is to identify win-win options, where possible, while considering the trade-offs when national development goals indicate certain priorities in these areas.

VI. Key themes and options

16. Various technological and policy options are available for making progress towards achieving the strategic objectives; however, member nations also should be aware of the associated trade-offs or consequences when choosing among the options. Countries may differ in prioritizing the objectives depending on their national development goals, and their priorities will influence their choice of options.

17. Various technological and policy options are covered under the following 11 broad thematic areas:

- Sustainable intensification of rice production
- Climate change mitigation/adaptation and risk management
- Environment and rice heritage
- Water and irrigation
- Gender roles and women's empowerment
- Food quality, safety and nutrition
- Value chain and post-harvest management
- Price policy and marketing
- Trade policy
- Regional cooperation on rice
- Food and nutrition security in Pacific Island countries (PICs)

18. A detailed analysis of these key themes, options and trade-offs implied by the various options is presented in the main text of the strategy paper. The summary below highlights some key points under each theme.

Sustainable intensification of rice production

19. Major technological options for various rice ecosystems (i.e. irrigated, rainfed lowland, upland and coastal) can be grouped into three types: (1) those that are related to improved rice varieties; (2) those that involve better management of crops and inputs; and (3) those that involve changes at the cropping/farming systems level. Sustainable intensification of rice production involves the integration of technologies for genetic and agronomic improvements as well as mechanization into an ecosystems approach to achieve higher productivity, profitability and resource-use efficiency, while protecting the environment.

20. The promising technological options for rice that are ready or near ready for farmer adoption include a new generation of hybrid varieties with higher yield potential and varieties with multiple tolerance to abiotic (e.g. drought, submergence, salinity) and biotic stresses. Similarly, crop and resource management practices designed to improve input-use efficiency, save input costs and reduce the environmental footprint of irrigated rice production include site-specific nutrient management (SSNM), integrated pest management (IPM) and water-saving technologies such as alternate wetting and drying (AWD) and aerobic rice systems. Some trade-offs are likely to be involved, however, in using these technologies. For example, AWD may save field-level water use, but this can result in higher use of agrochemicals (i.e. herbicides) to control the potential increase in weed infestation. It may lead to increased emission of nitrous oxide – a potent greenhouse gas. AWD may also reduce the environmental services provided by wetland paddies.

21. At the cropping systems level, a number of options (e.g. rice-fish, rice-livestock, rice-legume, rice-vegetables, rice-wheat and rice-millet systems) could be suitable, depending on the rice production environment.

22. The Regional Rice Initiative (RRI), a Pilot Initiative implemented in 2013 under FAO Strategic Objective 2, field tested some practices for sustainable intensification of rice production in three Asian countries. RRI may be considered, in synergy with the Regional Rice Strategy, as a vehicle with which to test technical options with small farmers and national governments.

Climate change mitigation/adaptation and risk management

23. There are a number of options for climate change mitigation and adaptation. One is to cultivate rice varieties that are tolerant of stresses such as drought, submergence, salinity, insect/diseases and high temperatures. Also, it may be suitable to change cropping systems from double rice cropping to rice-wheat rotation, rice-legume or rice-upland crops. Mitigation options include using the AWD method of irrigation to reduce methane emissions; managing site- and season-specific nutrients to reduce nitrous oxide emissions; and using rice straw to generate energy instead of burning on open fields. The trade-offs in using these practices involve balancing the emission of various greenhouse gases (e.g. carbon dioxide, methane and nitrous oxide) while increasing crop water productivity because methane is emitted under flooded field conditions but more nitrous oxide is emitted when rice fields are partially dried.

24. Options that improve risk management in rice production include timely and reliable weather forecasts; improved access to institutional credit; crop insurance; policies that promote crop and income diversification in rural areas; and increased trade to even out surpluses and deficits across countries and regions.

Environment and rice heritage

25. Rice fields protect the rice environment and heritage as a type of ecosystem service. However, intensification of rice systems based on excessive and improper use of agrochemicals and other related practices have resulted in a negative environmental footprint. These and other broader economic and social changes are negatively affecting rice biodiversity and rice heritage, which are important for the long-term sustainability of rice production. Major options to address these issues include integrated pest and nutrient management practices; landscape and community-level interventions for watershed protection; protection of important heritage sites; promotion of ecotourism; and development of marketable rice products with “cultural identity”. Equally important is to make best use of existing international tools, such as Globally Important Agricultural Heritage Systems (GIAHS), to promote agriculture heritages and to apply the concept of Geographical Indications (GI) to ensure the quality and origin of agricultural and agro-food products.

Water and irrigation

26. While water is a critically important resource for rice production, it is becoming more scarce, both physically and economically. In addition, deterioration of water quality because of agrochemicals and other contaminants is an increasing concern. Major options for rice production include improved on-farm water management to raise crop water productivity; modernization of irrigation systems; and conjunctive use and management of surface and ground water.

Gender roles and women’s empowerment

27. Women provide labour for rice farming and play an important intellectual role in all aspects of rice cultivation, consumption, conservation and commerce. Given this, food and nutrition security in the future will depend in important ways on ensuring that gender roles are well-integrated into the food security systems. Major options to mainstream the gender roles and empower women include mechanization to reduce drudgery and increase women’s labour productivity; targeted training programmes to improve women’s capacity to make managerial decisions; tertiary and vocational education programmes for women; promotion of women’s participation in demonstration trials and farmer meetings; and development of programmes that incorporate women’s special roles in food security systems.

Food quality, safety and nutrition

28. Food quality, safety and nutritional value are important considerations, especially for modern health-conscious consumers. Options to improve the quality, safety and nutritional value of rice include biofortification; breeding to obtain better yields of high-quality traditional varieties; improvements in milling technologies; promotion of healthy rice products (e.g. brown rice, rice bran and bran oil); use of processing technologies (e.g. parboiling to conserve nutrients); and compliance with food safety standards.

Value chains and post-harvest management

29. Tremendous opportunities exist to improve food quality, diversity and safety and to reduce post-harvest losses through enhancements of rice value chains. Rice value chains may be “traditional” or “modern export chains”. Traditional value chains are characterized by a low level of vertical integration and coordination, with rice being mostly processed and consumed within the local production areas. On the other hand, vertically integrated modern value chains mainly supply rice to large urban centres or to export markets. These modern value chains are rapidly emerging in Asia, although traditional value chains are still important components of the overall rice supply chain.

30. Major opportunities to improve the value chain and reduce post-harvest losses include mechanizing post-harvest operations; improving drying, storage and milling of harvested paddy; secondary processing of rice to enhance consumer convenience; using rice biomass to generate energy or to produce animal feed; and improving vertical coordination and shortening the rice value chain for greater efficiency.

31. Meanwhile, since the 1990s, rice consumption patterns in many Asian countries have shown a declining trend due to increasing dietary diversification. Associated with these consumption trends is the increasing amount of wasted cooked rice and leftovers after being served at the dining table. Therefore, there is a need to attract consumers for high value consumption through value addition (e.g. rice cakes, rice snacks, etc.), as well as to raise consumer awareness on table waste of rice and its implications.

Price policy and marketing

32. Rice price and marketing policies can be used to achieve different objectives, such as increased farmer income, improved consumer welfare, price stability and self-sufficiency. Efficient marketing that lowers marketing margins can benefit both producers and consumers. Major price policy and marketing options to achieve these objectives include trade control and stock management, futures markets and provision of market information. These policies affect the rice sector directly as well as indirectly through their effects on overall economic growth. These effects may benefit producers and consumers differently and may also involve trade-offs between short-term and long-term impacts on food security.

Trade policy

33. Strategic choices in trade policies for rice in Asia are governed mainly by domestic policy objectives. The major trade policy options differ depending on whether a country is an exporter or importer of rice. For importing countries, tariff protection is an important option, but it raises the domestic price, makes rice less affordable for the poor and results in inefficiency. Other options for import control are tariff rate quotas (TRQs), import licensing and import monopoly of state parastatals. Large countries, whose import requirements can be significant in the event of even a small supply shock, are less able to rely on trade than small importers. Rice export controls are a policy option sometimes used in the region. Generally there is no need to resort to such policies, but if they are used,

variable taxes are to be preferred to outright bans, and more transparency is also better so as not to induce nervousness among market participants.

Regional cooperation on rice

34. Cooperation is easier to establish with less-divisive issues such as sharing technologies/information, food safety and harmonization, but more difficult with divisive issues such as trade liberalization, policy coordination and positions on the WTO. Considerable progress has been made with less-divisive issues, e.g. rice information systems under ASEAN, regional food reserve ASEAN Plus Three Emergency (APTERR) and Agricultural Market Information (AMIS). Strengthening and expanding collaboration in such issues could help to build mutual trust for making progress in the more-divisive areas such as export restrictions and farm subsidies.

Food and nutrition security in the Pacific Island countries (PICs)

35. The major traditional staples of the PICs are root crops such as sweet potato, cassava, yam and taro. While their current level of rice consumption is low, it has increased over time. This has been supported mainly by increased imports because the level of rice production in PICs is low by Asian standards. This has come at the expense of consumption of traditional staples such as sweet potato, cassava, yam and taro. PICs must address a number of key questions, including: (a) What is the best way to build a resilient and sustainable food security system that integrates rice with traditional food crops?; (b) What is the economically optimal level of domestic rice production compared with imports?; and (c) What public investment and policy framework will promote long-term food security?

36. A major option for PICs is to increase the productivity of rice through the development and promotion of improved technologies. There are ample opportunities to transfer suitable technologies available in Asia and to carry out adaptive research, where needed, prior to dissemination. Another important option for PICs is to integrate rice with traditional crops to promote sustainability and resilience in the larger food system.

VII. Way forward

37. Wider consultations with stakeholders will be needed to translate the broad vision and strategic objectives into specific measurable targets and an implementation plan. Countries may differ in their priorities among the six objectives, depending on their context and national development strategies. The suitability of specific options, including the complementarities and trade-offs across objectives, will depend on a country's situation, and the choice of the best option or combination of options falls within the ambit of national policy-making. Clearly, member nations and international organizations such as FAO have important roles in facilitating wider consultations to develop an implementation plan that includes dimensions of both regional coordination and country-level policy.

38. As the next step, while promoting regional coordination and networking, national initiatives will be needed to translate the regional rice strategy into country-level actions by refining existing national rice policies or strategies, or formulating new ones in each country. To begin with, it is suggested to focus on a few pilot countries to support such national endeavors and actions.

39. Based on the broad analysis presented, the following three major areas of action are suggested:

- investment in research and development (R&D) to induce and support technological innovations in all stages of the rice value chain to achieve productivity and efficiency gains, better quality and nutritional value, greater resilience and environmental protection;
- policy and institutional innovations to promote rural income growth and rapid spread of improved technologies, and to develop a robust food security system that is stable and accessible to all; and
- investment in rural infrastructure.

These suggested actions are described briefly below.

Investments in R&D and technological innovations

40. As discussed earlier, a number of potential technological options exist to raise the productivity of rice-based systems through sustainable intensification. Increased investment in R&D is clearly needed not only to translate scientific innovations into specific technologies but also to carry out research in promising scientific areas. Examples of these promising areas include rice functional genomics; developing C4 rice; bioprospecting of genes and allele mining; engineering rice with biological nitrogen fixation; and resilience measures to address climate change. Other important avenues for impact include raising input efficiency through better agronomic practices, precision farming, mechanization and improvements in post-harvest value chains for efficiency gains.

41. Investments are also needed to scale out and up various innovations to generate impact rapidly. The power of modern information and communication technologies could be harnessed for large-scale dissemination of information and technologies. There are clear opportunities for impact through improved South-South collaboration for technology development and transfer. Constitution of a network among countries to share experiences and approaches is a high priority in this regard.

42. The private sector is now an important player in rice R&D and technology dissemination. The growth of private-sector investment clearly provides the opportunity to encourage the development of public-private partnerships to substantially augment the level of investment in these areas.

43. It is also essential that innovative methods and technologies be tested and adapted in local conditions and in collaboration with local stakeholders. This will ensure the relevance and sustainability of proposed innovations.

Policy and institutional innovations

44. Policy and institutional environments determine farmers' decisions on rice production and the overall transformation of the rice sector. Hence, suitable policies and institutional innovations are needed to encourage adoption of improved technologies. These include policies on price supports and subsidies; public expenditure for public goods such as infrastructure; regulations limiting farm size and land rental markets; and security of tenure. These policies affect incentives for technology adoption, mechanization, investments to improve irrigation and soil fertility and the pace of the structural transformation of agriculture.

45. New organization of farms will also demand new skills which could be provided through targeted education programmes, especially to women who are more likely to remain on the farm. Programmes could be designed to incorporate the special role of women in food security in Asia and to provide economic incentives to farmers/rural communities involved in the dynamic conservation of biodiversity and rice heritage. Local development and community-driven approaches will promote broad-based rural development by empowering rural poor people and disadvantaged and vulnerable communities.

46. Robust food security systems could be developed by managing price volatility through a combination of stock, marketing and trade policies. For the poor and vulnerable, farm-level activities that integrate various sectors, such as rice-fish, rice-livestock and rice-horticulture, can be a part of the safety net.

Investments in rural infrastructure

47. Investments in rural infrastructure (e.g. rural roads, electricity, schools and health facilities) promote overall rural development and have economic as well as social value. Increased investment in rural infrastructure is therefore needed to raise rural incomes and improve food security for the poor.

48. The overall approach of this regional rice strategy is also consistent with important elements of the Zero Hunger Challenge that is comprised of five pillars: i) 100% access to adequate food all

year round; ii) Zero stunted children less than 2 years of age; iii) All food systems are sustainable; iv) 100% increase in smallholder productivity and income; and v) Zero loss or waste of food. The Asia-Pacific Zero Hunger Challenge was launched in May 2013 and strives to achieve its objectives by 2025. National rice strategies or policies once formulated would be implemented within the framework of the Zero Hunger Challenge.