

SUPPLEMENTARY MATERIAL D

Projections made for rice systems in 2050 and interlinkages between seven key issues shown by colour coding

	Climate change	Technological advancements	Urbanisation	Changes in consumer profiles	Changes in labour demographics	Market and Policy shifts	Constraints on natural resources
Hazards such as floods and droughts are stronger and more frequent, leading to crop loss, unstable yields, and food insecurity							
Climate impacts (sea level rise, floods etc.) decrease arable land							
Out-migration from areas affected by climate change leads to loss of livelihoods							
The nutrient composition of rice grains is affected by climate change							
Some areas have become more suitable for rice farming							
More sustainable rice production due to climate-friendly policies							
Water scarcity compels the adoption of more water-efficient practices							
Stress-tolerant varieties as a result of advances in genetic research							
There is a slow growth rate of emissions from rice production due to technological innovations							
Technology, automation and mechanisation (use of drones, robots) enable large-scale farming but discourage smallholders							
Increased mechanisation reduces losses and increases productivity							
Technology reduces drudgery fixing the labour shortage problem and enabling women and youth to participate in rice farming							

Technology will enable countries to meet up with rice demand despite climate impacts		Blue				Brown	
Technology enables farmers to meet consumer demand for high-quality rice		Blue		Green			
Shorter duration rice varieties will allow rotation of rice with other crops		Blue					
More diverse rice systems, from high-tech monocropping to integrated systems		Blue					
Rice systems are more sustainable with lower emissions and more efficient use of water due to technological innovations	Light Blue	Blue					Yellow
Urbanisation affects the rice consumer profile depending on the region. In Asia, less rice but more meat and vegetables are consumed. In Africa, more rice consumption but lower consumption of roots and tubers			Light Green	Green			
Cross-regional migration changes consumer profiles in various locations. More people in Europe consume rice, opening up new markets			Light Green			Brown	
Less rice demand affects livelihoods in rice farming communities				Green	Light Orange		
Demand for high quality, more nutritious, low glycaemic rice, organic rice compels producers to focus on quality rather than quantity			Light Green	Green		Brown	
Lower rice consumption per capita as countries become wealthier and more people live in urban areas			Light Green	Green			
Rural-urban migration leads to inadequate labour in rice farms. Youths prefer white-collar jobs in cities to farm labour			Light Green		Light Orange		
Urbanisation reduces the agricultural land area			Light Green				Yellow
Cost of labour increases due to an ageing workforce and shortage of labour					Light Orange		
Rural-urban migration of people in search of higher income			Light Green		Light Orange		
Loss of traditional landraces as farmers emigrate out of their farms					Light Orange		Yellow
Youth disengagement from farming triggers a transition to more mechanised farming which increases youth interest in agriculture		Blue			Light Orange		
Labour demographic shifts lead to the consolidation of land holdings resulting in larger farms		Blue			Light Orange		
Political drivers mainly influence markets more than economic drivers						Brown	
A steady increase in global rice demand but a regional shift to Africa, leading to rice area expansion and self-sufficiency policies in Africa				Green		Brown	
Self-sufficiency policies distort the global rice market						Brown	
Developed countries and multinational companies protect their seed sources, limiting technological innovation in some regions		Blue				Brown	
Rice farmers transit to fruit-vegetable farming due to higher value						Brown	
Political crises trigger fewer investments in rice farming						Brown	
Exports continue to drive production						Brown	
Increased commodity prices provide opportunities for local rice producers					Light Orange	Brown	
Africa launches out as major rice exporter						Brown	
Better vertical and horizontal linkages between value chain actors lead to greater efficiency						Brown	

Rice loses market share to other crops that require less fertile soils and less water							
Land and water constraints due to population growth, competition from other agricultural uses and climate change							
Water shortages lead to rice price increases and consumers seek other staple food crops							
Adoption of more efficient irrigation systems due to resource constraints							