Technology Fact Sheet for Adaptation

Crop Diversification & Precision Farming [i]

Sector: *To be written by sector expert.*	Food
2. ***Technology Characteristics:***	Adaptation
2.1Technology Name:	6. Crop Diversification & Precision Farming.
2.2 Introduction: *low/high Brief introduction to the technology*	Increasing population and income growth demands more food and agricultural production. Increasing productivity in specific ecosystems is the only option as the pressure for agriculture lands is increasing. Further, decrease natural resources due to excessive and inappropriate usage and climate change would alter the ecosystem composition. Hence diversification of crops and precision farming with intensification would be needed to face emerging threats while maintaining the growth of agriculture production. Rainfall pattern and intensity and over- and inappropriate use would deplete available ground water. Increasing air temperature can directly affect productivity in certain ecosystems. Further, it can increase pest and disease outbreaks. Sea level rise shifts coastal non-saline and inundation boundaries further interior to the island. Therefore, the existing cropping patterns and systems would lose their productivity and economic viability. It will become necessary to critically re-design alternative integrated farming systems at ecosystem level. These changes must be tested and demonstrated in the farm in order to effectively utilize the natural resources and also to stabilize the production and profitability. Precision farming can compliment crop diversification in securing a sustainable agricultural system. Precision farming could match agricultural inputs and practices based on exact need of crops grown in specific eco system to minimize usage while improving the accuracy and efficiency of inputs. Precise application of inputs 'as needed and where needed' ensures avoiding overuse or under use of inputs protecting soil health and environment. Also, it reduces levels of water, fertilizer, pesticide, and labour use, and assures quality produce. In

	livestock production, precision farming can increase productivity through regulation of micro-environment, improving feed and fodder production, and assuring timely veterinary care.
2.3 Technology Characteristics/Highlights: *Few bullet points, ie. low/high cost; advance technology; low technology.*	• The technology envisages a modest cost: crop diversification may involve modest costs in land re-design; precision farming could add new costs for developing information systems and monitoring • It involves judicious combining of low and high technology progressively integrated over time • Some precision techniques could develop as proprietary products with high initial costs initially lowering their affordability
2.4 Institutional and Organizational Requirements: *How much additional capacity building and knowledge transfer is required for the adaptation option to be implemented.*	The development suitable packages would require collecting and processing large amounts of data, broadly across large areas of land and also at the individual farm level. Research and extension systems will have to develop capacity to manage such processes. Institutional innovation to integrate publicly-funded R&D outputs with commercial products in the sphere of precision farming techniques would become necessary.
3. Operations and maintenance	
3.1 Endorsement by Experts:	Changing cropping and farming systems have been practiced by farmers throughout the history to respond to demands for new products, overcome challenges to crop production due to varying weather and biotic environment, and improve incomes from farming. Scientifically designed recommendations for diversifying existing cropping patterns and farming practices would be acceptable by farmers. Sustainability concerns have raised interest in crop diversification and integrated farming away from the modern 'industrial' farming methods and the precision farming techniques have found high acceptability in supporting crop management towards improving efficiency of scarce resource use and reducing pollution from agriculture. Therefore, the technology should receive quick acceptance of scientists, policy makers and practitioners alike.
3.2 Adequacy for current climate: *Are there negative consequences of the adaptation option in the current*	Negative consequences of the adaptation option are minimal as concern towards increasing sustainability of agriculture has already endorsed many of the elements associated with the

climate? Some adaptation may be targeted at the future climate but may have costs and consequences under the current climate.	package. The recommendations have the potential to be progressively incorporated to farming over time somewhat cushioning the costs of adoption.
3.3 Size of beneficiaries group: *Technology that provides small benefits to larger number of people will often be favored over those that provide larger benefits, but to fewer people.*	The technology is innately suitable for large-scale adoption. In fact, some elements of the technology must be adopted as a general practice for optimum results and unit costs of certain precision farming techniques would significantly lower with widespread use by farmers. Also, some elements of the technology package have the public-good nature requiring state patronage in its expansion.
4. *Costs*	
4.1 Cost to implement adaptation options: *Cost measures*	Costs will be affordable as many components can be incorporated incrementally. Not all components will be relevant in the case of different combinations of crops and livestock enterprises. Thus it may be appropriate to enumerate costs from crop budgets for individual enterprises or enterprise mixes. Development costs and adoption costs for different units of precision farming techniques can be enumerated separately. Rs. 75.0 M is estimated as total implementation cost.
4.2 Additional costs to implement adaptation option, compared to "business as usual":	Additional costs to implement adaptation option will be estimated from costs of combining or introducing new techniques to the existing farming systems.
5. *Development Impacts, indirect benefits*	
5.1 Economic benefits: **Employment -** *Jobs* **Investment -** *Capital requirements*	- increases crop yield, quality and efficient use of farm inputs and labour would reduces cost of production - Ensure productivity and food security
5.2 Social benefits: **Income -** *Income generation and distribution* **Education -** *Time available for education* **Health -** *Number of people with different diseases.*	• Minimized health problems from environmental pollution , resulting from indiscriminate resource use • Increased returns to resource use and improving the attractiveness of farming, particularly to youth, through adoption of high-tech methods.
5.3 Environmental benefits: *Reductions in GHG emissions, Local pollutants,*	• Prevents soil degradation in cultivable land. • Reduction of chemical use in crop production • Efficient use of water resources and other natural

Ecosystem degradation etc	resources • Reduce GHG emission as demand driven fertilizer management systems emit low NOx and other gases
6. ***Local context***	
6.1 Opportunities and Barriers: *Barriers to implementation and issues such as the need to adjust other policies.*	There will be no barriers to implement this technology and policy directions are in place at present to support it.
6.2 Status: *Status of technology in the country*	Some technological advancements are needed in the area of precision farming in particular.
6.3 Timeframe: *Specify timeframe for implementation.*	3-4 years
6.4 Acceptability to local stakeholders: *Whether the technology will be attractive to stakeholders*	Yes

[i] **This fact sheet has been extracted from TNA Report – Technology Needs Assessment Reports For Climate Change Adaptation – Sir Lanka. You can access the complete report from the TNA project website http://tech-action.org/**