



## PLATFORM FOR AGRICULTURAL RISK MANAGEMENT

### Terms of Reference for the Risk Assessment Studies

10<sup>th</sup> February 2015

#### Context

The Platform for Agricultural Risk Management (PARM), a G8-G20 initiative hosted by the International Fund for Agricultural Development (IFAD), provides technical support to Governments on Agricultural Risk Management ([www.p4arm.org](http://www.p4arm.org)). PARM Secretariat is working in the African continent in strategic partnership with the NEPAD Agency (African Union's New Partnership for Africa's Development), which, in collaboration with the Food and Agriculture Organization (FAO) has been establishing since 2011 an Agriculture and Food Insecurity Risk Management (AFIRM) initiative to support African countries in mainstreaming agriculture and food security risk management into their Comprehensive Africa Agriculture Development Programme (CAADP) implementation (Antonaci et Al., 2013).

Agricultural Risk Management (ARM) can significantly contribute to improve the resilience of vulnerable rural households by increasing their capacity to absorb and adapt to risks. The PARM is a global platform that builds on existing initiatives and knowledge, in particular from the World Bank that has already undertaken "agricultural sector risk assessment" reports in several countries, the FAO, the World Food Program (WFP), Non-Governmental Organizations (NGOs) and the private sector. The PARM activities are oriented to facilitating the development of Agricultural Risk Management knowledge and tools, creating synergies and complementarities among different partners and stakeholders. This specifically applies to the Risk Assessment Studies (RAS) under this Terms of References (ToR): they necessarily need to build on existing reports and statistics from other organizations and partners.

The PARM process follows five phases in a given country (The Country): setting up of activities, risk assessment, policy dialogue, follow-up and implementation. The first substantial phase of the PARM process consists in assessing agricultural risks through a long-term vision and a holistic approach (OECD, 2009). It is essential to begin the process from the risk assessment in order to define the problem before the potential solutions that will subsequently emerge in terms of risk management tools to be discussed and evaluated. The risk assessment phase is built on a risk assessment study that is then discussed in a National Stakeholders Workshop. As a result of the risk assessment study and discussion with stakeholders, a Policy Dialogue will lead to the identification of the main ARM priorities in a roadmap, including capacity building support to improve local stakeholders awareness and knowledge on Agricultural Risk Management (ARM), as well as capacity to manage and conduct appropriate institutional reforms in countries and regions. The identified ARM tools will be the subject of different feasibility studies and policy dialogue, both of which are outside these TOR. The final objective of the whole process is facilitating a holistic risk management strategy mainstreamed into national policy documents and agricultural investment plan, and its implementation, by matching the demand and supply of ARM tools suitable for farmers, market level stakeholders and Governments.

The Risk Assessment Study (RAS) should be useful beyond the PARM-NEPAD process. The resulting document should be usable as reference guide for the government, all stakeholders, the donors, service providers and International organizations that work on agricultural risk management issues in each country. To the extent possible the RAS in all countries will follow a similar methodology and common indicators so that country comparisons can be undertaken.

#### Purpose

***The purpose of the RAS is to provide a comprehensive mapping and assessment of agricultural risks in The Country over the past three decades and in the foreseeable future, and inform about their likelihood and their economic and agricultural impacts, as well as their impact on the livelihoods of rural producers. The RAS will be conducted in a rigorous and holistic manner to ensure that the study is a useful tool and reference for all stakeholders to identify and prioritize main agricultural risks and risk management gaps and needs.***

The risk assessment study will have five main objectives: to inform on the main risk factors and their likelihood; to analyse their economic and agricultural impacts; to identify and assess the existing ARM tools and policy instruments; to identify the main ARM gaps and needs; provide guidance for a prioritization of

agricultural risks and ARM tools to be implemented. The scope of the study is defined through the following set of definitions that are applicable to this RAS.

*Definition of the scope of the work under the RAS*

*What is a risk?* Risk is the effect of an uncertain event (potential situation or scenario), involving exposure to danger or loss of something of value. A risk can typically impede the achievement of the objectives of individuals or organizations (ISO 2009a).

*What is an agricultural risk?* Agricultural risk is a risk from any origin that involves a loss or damage on agricultural production, farm household income or food security.

*Whose risk? Impacts on whom?*

- First, the RAS will analyse the agricultural risks that threaten the poverty and food security levels in the country. These risks are systemic, that is, they affect significant population groups or regions. The government is accountable to put in place the tools and the enabling environment that help to manage these risks. This is the country or government level risk.
- Second, the RAS will also analyse agricultural risks that can damage the economic activity and livelihood of farm households and the rural poor, particularly poor smallholders. Some of these risk situations are systemic, but others may only affect an individual farm or household, or a small group. The farmer bears these risks and is primary responsible to manage them using available policies and strategies. This is the producer level risk and will have a particular focus on poor producers and smallholders.

*What does "holistic approach" mean?* It means that, both at the farmer and the government level, all agricultural risks and their interactions are considered in the risk analysis, and all possible risk management tools and techniques and their interactions are also analysed. This includes risks that are originated in any link of the value chain and tools that are facilitated by any private or public entity.

*What does rigorous assessment mean?* It is an assessment that uses all available quantitative and qualitative information and statistical sources to estimate the frequency and consequences of agricultural risks at both government/country level and farm level. Rigorous means evidence based and, to the extent possible, expressed in quantitative terms including the likelihood of occurrence of a risk, and the losses or damages that it is expected to cause. Risk perceptions, if recorded with some method, can also be part of the risk assessment.

*What is the sectorial or geographical coverage of the RAS?* The RAS will provide a good overview of agricultural risks in the whole country. However a differentiated assessment may be needed for specific geographical areas, specific commodities and value chains, and socio-economic groups<sup>1</sup> (sectors). The ToR of the RAS in a specific country may require a special geographical or sectorial focus that will be discussed with the national stakeholders and decided in an early phase of the RAS.

The main outcomes of the RAS will be discussed and validated during a National Stakeholder Workshop, followed by a Policy Dialogue. This Agricultural Risk Assessment Study will benefit from methodological developments in other risk assessment studies such as OECD (2011 and 2014), and World Bank (2013), and also from vulnerability assessment studies undertaken by various UN institutions and NGOs including WFP, FAO and OXFAM. It will use as point of departure any available agricultural risk assessment report on The Country.

### **Outcome**

***The main outcome of a RAS will be a report including four main components: 1/ country context and identification of agricultural risks; 2/ mapping of existing agricultural risk management tools and initiatives; 3/ development, analysis and evaluation of risks; 4/ prioritization of risks and risk management needs.***

<sup>1</sup> For the purpose of this TOR, these specific geographical areas, value chains, and socio-economic groups will be referred as "sectors", regardless if they are defined by geographic, productive, economic or social characteristics.

The assignment of the four components could be conducted by a single expert or team, or it could also be divided into parts. For examples: Part I including the two first components could be conducted by a national expert or team; Part II including the last two components that require more statistical and econometrical expertise and could be conducted by an international expert or team. The work will have to be undertaken in close coordination to create synergies as the information of Part I will inform Part II and the overall outcome of the RAS. All these outcomes will be shared and discussed during the validation workshop and the Policy Dialogue process.

The author/s will present the report during the National Stakeholders Workshop for prioritization, and will proceed to the revision of the RAS to reflect the views expressed by the stakeholders during the workshop.

In any case the final report will include possible recommendations or priorities to improve agricultural risk management and related tools, to implement specific capacity building activities or to develop information tools.

### **Outline of the study**

The full study will cover all the items in the following outline. However in some countries the existing analysis and needs may differ, and some items in the outline could be undertaken as single items.

- I. **Part One**
  - 0. Introduction: The country context**
  - 1. Identification of agricultural risks: country risk profile**
  - 2. Mapping of existing Agricultural Risk Management tools and policies**
- II. **Part Two**
  - 3. Risk analysis: a systematic quantification of impacts and likelihood**
  - 4. Prioritization of risks and ARM tools**
  - 5. Sources and methodology**

Following ISO (2009b), the outline of the report distinguishes between risk identification, risk analysis and risk evaluation. In the context of agricultural risk management, a specific section is included on identifying and analysing the exiting ARM strategies in The Country. The content of each of the items in the outline is further described below.

#### **0. The country context**

This section will provide an overview of the production, economic and demographic characteristics of the agricultural sector, in particular those aspects that are more relevant for agricultural risk management. Some key aspects to analyse are: the importance and trends of the food and agricultural sector for GDP, employment, imports and exports; the incidence of poverty and malnutrition, in particular in rural areas; the major characteristics of the agricultural sector and the influence of production structure on the risk exposure (e.g. agro-climatic zones, farm size, share of subsistence farming, irrigation); the major commodities and production trends for crops, livestock, fisheries, and forestry, and their relative importance for vulnerable populations; the employment level and the share of small-scale farmers for each major commodity and zones; infrastructure and public goods (e.g. transportation, energy services, agricultural information and extension systems, warehouses and storage facilities, weather stations, financial sector infrastructure, telecommunication, fertilizers and seeds markets...); market structure and access (for smallholders), private sector actors (MFI, Banks, Insurances...), organizational level of farmers, productions and productivity of most relevant commodities.

This information will be the basis to identify the sectors, agro-ecological zones and groups of farmers that are important and deserve to be the main focus of the study. If their risk exposure is likely to differ, separate information on the specific risks of these specific "sectors" will be provided in the risk assessment study in the following sections.

#### **1. Identification of agricultural risks: country profile**

##### *Purpose*

The agricultural risk country profiling consists of identifying and reviewing the available literature and statistical sources on agricultural risk in The Country and presenting its implications in a systematic way. The profile will identify and review all available studies and documents related to agricultural risks in The Country, both at the national/government and at the producer levels. It will also identify all other sources of

quantitative (statistical) or qualitative information on agricultural risks and risk perceptions. This information will be presented in an integrated manner to provide a clear profile of the agricultural risks in The Country.

### Scope

The following risks will be considered in the identification process, even if not all of them may need to be part of The Country profile (Table 1): (i) food security and agricultural production (drought, floods, crop pests and diseases, livestock diseases); (ii) food markets and trade (output price risks, fertilizer, feed, improved seeds and other input risks); (iii) policy and regulatory risk (e.g. related to trade); and iv) other risks affecting household income and food security (e.g. wages and non-farm income). The impact of the different risks at national level for the Government and on smallholder livelihoods will be analysed. The risk profile will include an assessment and quantification of the different risks (likelihood and severity of damage) in the different "sectors" at both government and producer levels.

**Table 1. Sources of agricultural risk**

Weather-related risks	Periodic deficit and/or excess rainfall or temperature, hail storms, strong winds, cropping calendar changes...
Natural disasters (including weather)	Major floods and droughts, hurricanes, cyclones, typhoons, earthquakes, volcanic activity
Biological and environmental risks	Crop and livestock pests and diseases; contamination affecting food safety; contamination and degradation of natural resources and environment; contamination and degradation of production and processing processes
Health risks	Health risks for members of the household and farm workers; production failure for health and/or food insecurity reasons;
Market-related risks	Fluctuations in prices of inputs and/or outputs due to different causes such as changes in national, regional or international supply and/or demand that impact domestic, regional and/or international markets; changes in demands for quantity and/or quality attributes, changes in food safety or production requirements; delays and disruptions of charges along the value chain...
Logistical and infrastructural risks	Changes in access (physical or economical) to transport, communication, energy; degraded transport, communication or energy infrastructure, due to physical destruction / lack of maintenance, conflicts and political or labour disputes
Management and operational risks	Uninformed or poor management decisions in asset allocation, choice of crops and seeds, swing time, equipment; use of inputs, planning errors, breakdowns in equipment, inability to adapt to changes. Health risks for members of the household.
Macroeconomic Public policy and institutional risks	Macroeconomic shocks and downturns. Changing or uncertain policies and weak enforcement: monetary, fiscal and tax; financial (credit, savings, insurance); unpredictable regulatory and legal measures; trade and market disruptions; uncertainty land tenure. Governance uncertainty: corruption, weak institutions.
Civil unrest, conflict and Political risks	Security-related risks and uncertainty (e.g., threats to property and/or life). Social/political instability within and in neighbouring countries. Nationalization of assets for foreign investors.

### Outcomes

- A literature review of reports and sources that identify and measure agricultural risks in The Country, mainly expressed in terms of variability, or severity and frequency.
- A review of available statistical sources in The Country to identify and measure agricultural risks in The Country. Those will typically be time series data on diverse matters such as weather, production, prices, input use, nutrition etc. and household or other surveys.
- Based on the previous information, an integrated and systematic presentation of the agricultural risks in The Country (risk profile).
- An assessment of the implications of Climate Change on the future agricultural risk profile of The Country.

*Main sources*

- The literature review will cover academic papers, government documents and reports from international organizations or NGOs.
- The review of statistical sources will look at all the offer of surveys (including farm household surveys and vulnerability assessments), censuses and other statistics from the statistical agency/ies in The Country, the meteorological agency/ies, the research centres, International organizations and NGOs.
- Other source of information could include interviews with experts and stakeholders.
- The systematic risk profile will be based on the previous information. Further analysis of this information will be undertaken in Section IV.

*Methodology.*

The main methodology will be literature reviewing and basic statistical and graphical risk analysis. The use of tables of indicators and graphs will be an essential part of the country risk profile.

The reviewed studies could have been based on statistical analysis of time series of historical information or on other sources of information gathered with all kind of methods. According to ISO-IEC (2009) the most applicable methods for risk identification are: brainstorming, structured or semi-structure interviews, Delphi techniques to combine experts' opinions and scenario analysis.

The assessment of the ARM implications of Climate change will be done on the basis of the available literature and sources.

## **2. Mapping of Agricultural Risk Management initiatives**

*Purpose*

The mapping of risk management initiatives and tools consists of identifying, describing and analysing the main government policies, donor-financed initiatives, market instruments, community devices and farm household strategies that have high incidence in facilitating the management of risk and government or producer level. The scope, participation, financial resources and implementation of these initiatives will be investigated, presented and discussed. The analysis will focus on matching the existing initiatives with the risks and sectors for which they provide risk management solutions. It will also discuss the possible interactions between different tools and how they reinforce or crowd out each other, and the institutional and policy gaps.

*Scope*

The review will cover experiences, ongoing projects, coordination mechanisms and studies related to instruments for agricultural risk management. These will include local strategies led by households or communities, market tools to transfer risk and government policies, focused on either risk reduction, mitigation or coping (Table 2). Government policies can also be designed to underpin market tools or local strategies. For instance: technology adoption, disaster risk management, safety nets (both producer and consumer oriented), insurance schemes and financial products including from microfinance institutions; market and trade risk management such as warehouse receipt systems, commodity exchanges, market information systems and contract farming; grain stock management and trade policies; and any other risk management strategy. If the list of existing initiatives is too long for a single report, at least a full list of initiatives should be presented and only a selection of tools will be analysed. The selection will include the tools with the largest scope of use or financial size, the largest potential to respond to the main risks in The Country and the largest innovative potential (World Bank 2005). The assessment could include political economy aspects that are relevant for understanding the existing measures and for the implementation of potential new ARM tools.

For each initiative or tool the report will provide:

- Background information including type of ownership of risk management programs and projects (public, private, cooperatives, NGO), coverage, major hurdles (in relation to accessing the instrument by small holders), etc.
- Review and assess the performance of existing tools, coordination mechanisms, regulations, legal frameworks, programs and policies in place;

- Identify institutional and policy gaps and chart out a strategy/direction to cover them and meet the diversified needs of the rural community and the value chain.

**Table 2. Risk management tools and strategies**

	Local strategies	Market tools	Policies
Information	Information Systems on weather, production, yields, prices, pest and diseases.		
Risk reduction and mitigation	Technological choice, Diversification in production Crop sharing Common storage facilities and other Community base coord. Mechanisms for risk sharing	Training on risk management Commodity exchanges (Futures. options...) Insurance Vertical integration Contracts in production or marketing Spread sales and warehouse receipts Diversified financial investment Off-farm work	Macroeconomic policies Legal frameworks Disaster prevention (flood control) Prevention of animal diseases Early Warning Systems ARM coordination platforms Regional market and trade policies Tax system income smoothing Counter-cyclical programmes Border and other trade measures (e.g. in the case of contagious disease outbreak)
Risk coping	Borrowing from neighbours/family (ROSCAs...) Intra-community charity Small scale loans Selling assets	Selling financial assets Saving/borrowing from banks and Microfinance Institutions Off-farm income / work	Disaster relief Social assistance Agricultural support programmes Emergency stocks

#### *Outcomes*

- An inventory of all identified agricultural risk management tools and strategies
- Description of the scope and characteristics of each tool and strategy
- Analysis of the performance and matching between existing tools and existing risks
- Identification and discussion of policy gaps

#### *Main sources*

- A review of all sources of statistical information (including time series) related to agricultural risks.
- Government information and reports on existing policies and implementations
- Reports and information of International Organizations, NGOs and research centres on the performance of existing agricultural risk management tools
- Existing work on resilience strategies in The Country
- Interviews with government officials, experts and stakeholders

#### *Methodology*

The main methodology is the review of the existing policy information and reports for a policy assessment. Existing policy analysis will also be reported.

### **3. Risk analysis**

#### *Purpose*

Risk analysis involves understanding the risks, their natures causes and sources, and, to the extent possible, quantifying their likelihood and consequences at the country level and on smallholders livelihoods. It also involves understanding the existing ARM tools and strategies and, to the extent possible, quantifying their implications for producers and government and their capacity to contribute to manage agricultural risks. Finally it implies the identification and analysis of the main ARM gaps and needs in The Country.

### Scope

This section on risk analysis will be quantitative and complement the discussion and assessment of existing reports and available statistics in Part One. This component of the study requires the use of more sophisticated techniques to analyse the risk and tools that have already been identified. Original analysis of statistical information, in particular in time series form, is expected to quantify the consequences and likelihood of different risks.

The analysis should cover the two levels envisaged in this study: the national level, and the producer/household level. Aggregate, commodity, market and sector specific data will be the main data source for the former, while individual data on households and farms will also be used in the latter. The availability of such data should be investigated during section 1 on country profile. Among the producers, the analysis should also investigate the impacts for different "sectors" if identified as having differentiated risks in Part One.

The analysis could include measuring and understanding the variability of weather, prices, production, yields, income, consumption and other relevant variables. Statistical methods will be used to measure variability. The main indicator of variability will be the standard deviation or the coefficient of variation<sup>2</sup> of the variable/s that best summarize/s the impact of risks on livelihoods and food security, such as income, consumption or nutrient intake in the household and their distribution across households. Other indicators to analyse the risk could also be envisaged. The indicators developed by the study will be compared or presented together with any other risk assessment indicators available in The Country.

Shocks of different degrees of severity will be identified using historical data. The analysis will attempt to define three risk layers: frequent but small normal risks, medium risks and rare but very damaging risks (disasters). These different layers normally have different requirements in terms of policy action (OECD 2009). Two criteria could be used of the identification of risk layers: the severity of the impacts compared to the average variability, and the frequency or likelihood of such events to occur.

The occurrence of normal, medium and disaster consequences will be associated with the occurrence of specific situations or sources of risk. To the extent possible, different risks will be characterized with the corresponding indicators of variability, mean severity and frequency, and subsequently classified in different risk layers.

The correlation between different sources of agricultural risk will also be investigated and appropriate indicators of correlation developed, calculated and incorporated into the analysis.

The existing ARM tools and strategies and the actual beneficiaries will be analysed with respect to the main risks identified in the study. This analysis could be based on the knowledge about the ARM initiatives in previous section, but further analysis including modelling is encouraged. This may require the use of economic models with uncertainty, Montecarlo simulations and/or scenario analysis.

Finally, the indicators about The Country will be benchmarked with respect to other relevant countries, whenever possible.

### Outcomes

- Statistical analysis of risks using time series at aggregate country level and at producer level data, possibly with some differentiated sectors of producers.
- Table/s of agricultural risk indicators: one aggregate for the country and possibly, one by sector of producers.
- Table/s of agricultural risk correlations.
- Table of main agricultural risks and available initiatives to manage each of them, with indicators of their capacity to deal with that risk.
- Analytical report on The Country Risk Assessment
- An assessment of availability of data in The Country for Risk Analysis

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<sup>2</sup> These indicators may need to be adjusted for the trend in the time series. This could be done using the Cuddy and Della Valle (1978) index, or using the standard deviation of the percentage change in the variable (this is typically called volatility and applied mainly to prices).

*Main sources*

- Statistical sources on production, yields, income, consumption, prices and weather, from statistical agencies, International Organizations, Research institutions or NGOs.
- If available, household income or expenditure surveys are recommended for the producer risk assessment.
- Possible elaboration of specific surveys for the study, if resources are available
- Existing reports on risk assessment from any source.
- If quantitative information is not available, qualitative sources will be used.

*Methodology*

The main methodology is the time series analysis of available statistical sources. Whenever the analysis of the past is likely to be biased to estimate future risks (e.g. implications of climate change on weather conditions), the likely sign and size of the bias should be discussed. According to IOS-ICE (2009) other methods may include: supporting methods based on a structured discussion in a meeting or workshop of experts or stakeholders (e.g. SWITF); Scenario Analysis defining a specific set of scenarios of risks and policies (this will typically require to be supplemented with an economic model) and more sophisticated statistical methods based on Montecarlo simulations, Markov analysis or Bayesian statistics.

If resources are available, specific policy analysis could also be covered or undertaken. This would require the use of economic models with uncertainty, Montecarlo simulations and/or scenario analysis. See OECD (2014) for an example of the use of these type of policy analysis.

If quantitative information is not available, qualitative sources and methodologies will be applied.

**4. Prioritization***Purpose*

Risk evaluation and prioritization involves using the information and indicators from the country profile and the risk mapping (sections 1 and 2) and the risk analysis (section 3) to assist agricultural risk management policy decision making. This assistance will involve the development of easy-to-use graphs or tables showing the main characteristics of different risks, the vulnerability to those risks, the impacts of existing ARM tools and, subsequently, the existence of ARM gaps.

*Scope*

The objective of this Section is to identify the main gaps in terms of the existing risks and the ongoing risk management activities, tools, policy and coordination mechanisms in the country. This final step of the risk assessment study (RAS) focuses on a prioritization of risks based on the previous analysis. The prioritization is based both on aggregate figures (e.g. overall losses to the GDP) as well as on disaggregated figures for producers, particularly small holders (e.g. events that may not affect overall GDP severely and may not affect many producers at the same time, but that have major consequences for large numbers of smallholders producing certain commodities, in particular non-traded ones). The discussion about the prioritization of risks should be based on a method such as the Consequence / probability matrix, and/or scenario analysis. Other methods could be proposed and implemented if appropriate.

This final section will provide the national government and the stakeholders with clear assessment of:

- Priority risks to make rational decisions on what areas to focus on. The analysis quantifies risks and their impact at country and producer level and allows the government to make an evidence-based prioritization of risks.
- The analysis will point out tools and policy instruments that could efficiently improve agricultural risk management in The Country related to the identified risk priorities and level of vulnerability to those risks. It will include specific suggestions for feasibility studies to manage the identified prioritized risks to be implemented.
- Gaps related to information and capacity. The analysis will assess which are the most critical capacity and information needs and bottlenecks. It will also include suggestions on improving information, knowledge and capacity.

### *Outcomes*

- Consequences / probability matrix
- Changes in the Consequence probability matrix of the use of different tools.
- Scenario Analysis covering: a limited number of scenarios that are identified and quantified with event/consequence/likelihood information; and a limited number of tools and their consequences in each scenario.
- Based on the previous analysis recommendations (or policy options) on identified information gaps and risk management priorities.

### *Main sources*

Risk identification, mapping and analysis in previous sections.

### *Methodology*

The use of Consequence / probability matrixes, and scenario analysis are strongly advised. Other methodologies could be developed.

The use of supporting methods such as discussions in meetings or workshops of experts and/or stakeholders should be envisaged if possible as part of this study and the PARM process.

## **5. Sources and methodology**

The last section of the study will be devoted to discuss all the information and methodological challenges in The Country. The methodological choices made for the study will be discussed and well documented.

## **References**

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