

REPUBLIC OF KENYA



MINISTRY OF AGRICULTURE, LIVESTOCK AND FISHERIES

STATE DEPARTMENT OF AGRICULTURE

NATIONAL RICE DEVELOPMENT STRATEGY (2008 – 2018)
[REVISED 2014]



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ABBREVIATIONS

AFC	Agricultural Finance Corporation
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
ASDS	Agriculture Sector Development Strategy
ASK	Agricultural Show of Kenya
AU	African Union
ATIRI	Agricultural Technology and Information Response Initiative
CAADP	Comprehensive African Agricultural Development Program
CARD	Coalition for African Rice Development
CBOs	Community Based Organizations
CIGs	Common Interest Groups
CoK 2010	Constitution of Kenya 2010
COMESA	Common Market for Eastern and Southern Africa
DRSF	District Rice Stakeholders Forum
EAC	East African Community
ECARRN	Eastern and Central Africa Rice Research Network
ERS	Economic Recovery Strategy
FAO	Food and Agriculture Organization
FARA	Forum for Agricultural Research in Africa
GDP	Gross Domestic Product
HIV/AIDS	Human Immuno Deficiency Virus/Acquired Immune Deficiency Syndrome
IWUAs	Irrigation Water Users Association
ICT	Information Communication Technology
IRRI	International Rice Research Institute
JIRCAS	Japan International Research Centre for Agricultural Sciences
KARI	Kenya Agricultural Research Institute
KEBS	Kenya Bureau of Standards
KEPHIS	Kenya Plant Health Inspectorate Service
KIRDI	Kenya Industrial Research and Development Institute
LBDA	Lake Basin Development Authority
MDG	Millennium Development Goals
M&E	Monitoring and Evaluation
MoALF	Ministry of Agriculture, Livestock and Fisheries
MTEF	Medium Term Expenditure Framework
NARS	National Agricultural Research System
NCPB	National Cereals and Produce Board
NEPAD	New Partnership for Agriculture Development
NFNSP	National Food and Nutrition Security Policy
NGOs	Non-Governmental Organization
NIB	National Irrigation Board
NRDS	National Rice Development Strategy
NRDSF	National Rice Development Stakeholders Forum
NVRC	National Variety Release Committee
PRSF	Provincial Rice Stakeholders Forum

PRSP	Poverty Reduction Strategy Paper
SDA	State Department of Agriculture
SRA	Strategy for Revitalization of Agriculture
STAK	Seed Traders Association of Kenya
SWOT	Strengths Weaknesses Opportunities Threats
TARDA	Tana and Athi River Development Agency
WARDA	West Africa Rice Development Association (Now Africa Rice Centre)

Preface

The Ministry of Agriculture, Livestock and Fisheries conscious of the importance of the agriculture sector to the national and county's' economy and the livelihood of the Kenyan people, has set itself to make the sector vibrant. Despite the enormous potential of the rice sub-sector in enhancing food and nutrition security and livelihoods for the majority of urban and rural populations in Kenya, it had not received adequate attention with regard to policy and institutional support until 2008. Consequently there was little growth of the sub-sector in spite of the huge potential that exists in the country. In this regard, the Ministry has endeavoured to revise a comprehensive, practical and all inclusive National Rice Development Strategy (NRDS) for the period 2008 – 2018 during the midterm evaluation of achievements and challenges. The plan focuses on what the Ministry intends to accomplish and how it will direct resources towards realizing the desired goals within the given time frame 2014 - 2018. Timely actualization of the NRDS will lead to enhanced implementation to the Ministry's programmes thus enabling the Ministry realize its rice production targets, objectives and mission.

The strategy sets the vision, mission, objectives and strategies that Ministry will pursue in the last five years of NRDS implementation with the aim of facilitating growth and development of the rice sub-sector. It will form the basis of which work plans will be formulated at national and county's' functional units and individual levels. The NRDS, will also be an instrument of bidding for resources at the national, international and from private sector investors and county' governments.

The NRDS sets out the contribution of the Ministry to the implementation of the Strategy for enhancing rice production, processing and marketing along the value chain attributes. In this regard cognizance has been taken of the new organizational structure that has been agreed upon and designed to meet the challenges of expanding rice production for food and nutrition security and wealth creation.

The process of preparing the plan has been one of the participatory consultations between the State Department of Agriculture, County governments and other stakeholder institutions on rice development. Account has been taken of the past policies on rice and various government strategies aimed at the development of the agricultural sector and the economy and food and nutrition security as a whole.

From efforts to strengthen commercialization of rice farming this strategy envisages a structure that will be able to focus on core functions as we move rice production, processing and marketing into private-public sector partnerships with support from development partners.

I wish to recognize the support of the Cabinet Secretary for Agriculture, Livestock and Fisheries Mr. F. Koskei, not only in the process of revising this NRDS but also to all reforms and restructuring in rice production sub-sector that the Ministry is undertaking and plans to up-scale. I also wish to recognize the technical support and guidance given

to the taskforce by Dr. Johnson W. Irungu, Director Crop Management and Ms. Beatrice Kingori, Deputy Director Crop Management. I wish to thank the technical and support team lead by Bibiana Walela, Head Rice Promotion Unit and the able officers from the partner institutions for their hard work and endurance during the period of the preparation of this Strategy. I specifically want to acknowledge other members of the Team that included: Prof. J.C. Onyango, Chairman, National Rice Technical Committee (NRTC) together with NRTC members; Mr. W.O. Kouko, Mr. R.G. Ngigi, Mrs. A.W. Kimani, Prof. C. Kanali, Dr. J.M. Kimani, Eng. D. Njogu, Mr. P.O.W. Webi, Mrs. H. Baraza, Mrs. A. Mutinda, Mr. H. Agesa, Mr. F. K. Muga, Mr. D. Bunyatta and Dr. R. Wanjogu and finally Ms. Margaret Ondicho for valuable secretarial services.

It is my sincere hope that this strategy will meet the expectations of the Government, Development Partners, Private sector but more importantly, the needs of the farming community and producers and others in the rice value chain subsector who wholeheartedly participated in National Rice Stakeholders meeting.

Sicily K. Kariuki (Mrs) MBS.
PERMANENT SECRETARY

KENYA NATIONAL RICE DEVELOPMENT STRATEGY

1.0 INTRODUCTION:

Rice cultivation was introduced in Kenya in 1907 from Asia. It is currently the third most important cereal crop after maize and wheat and has been categorized as one of the strategic crop for food and nutrition security. It is grown mainly by small-scale farmers as a commercial and food crop in the major rice irrigation schemes in Central, Nyanza and Western regions of Kenya. About 89% of the rice grown in Kenya is from irrigation schemes established by the Government, community-based smallholder farmers' associations/groups and the private sector while the remaining 11% is produced under rain-fed ecologies. However, production in both irrigation and rain-fed ecologies is set to increase with expansion of existing and establishment of new irrigation schemes and dissemination of production technologies in upland systems.

Globally rice is one of the most important food crops in the fight against hunger. The total annual world production of milled rice in 2013 stood at 496.9 million tonnes which compares favorably well with maize and wheat. The global area under rice is forecasted by Food and Agriculture Organization (FAO) to rise by 1.2% (to 505 million hectares in 2014) and yields to increase by close to 1%. In addition, unlike maize and wheat that are consumed as human and livestock feed, rice remains the most favoured grain globally for human consumption (Ito, 2002) but the use of by-products is increasing in the rice value chain. Development of rice therefore presents an opportunity to reduce the number of gravely food insecure people that was 816 million by half by 2015 according to the World Food Summit 1996 - Millennium Development Goals (MDG). However the number has now grown to 842 million as at end of 2013.

FAO's forecast of global rice trade in 2013 was expected to reach 38.3 million tonnes due to the release by Thailand of its rice stocks, however imports in 2015 are expected to drop to 93.0 million tonnes following an announced tightening of border controls and import licenses allocations as reported by FAO. Importation of rice is under the control of the private sector, which is exposed to the risks of a global financial meltdown. Many African countries are expected to cut down imports and focus on local production of rice. Due to its importance, international partners and Pan-African initiatives such as FAO, New Partnership for Agriculture Development (NEPAD), Comprehensive African Agricultural Development Program (CAADP), Forum for Agricultural Research in Africa (FARA), Eastern and Central Africa Rice Research Network (ECARRN), Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) and East African Community (EAC) have shown interest in

research and development for the benefit of the livelihoods of communities living particularly in sub Saharan Africa.

Most Kenyans living in the rural areas consume limited quantities of rice, but it forms an important diet for the majority of urban dwellers. The annual consumption is increasing at a rate of 12% as compared to 4% for wheat and 1% maize, which is the main staple food. This is attributed to progressive change in eating habits. The national rice consumption is estimated at 548,000 tonnes compared to an annual production of 129,000 tonnes in 2013. Table 1 show the national and global rice production and consumption trends from 2008-2014. The deficit is met through imports which are valued at Kshs --- . Promotion of rice production will therefore improve food security, increase smallholder farmers' income contribute to employment creation in rural areas and reduce the rice import bill.

Table -1: Rice Production, 2007 - 2013

Year	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
Area (ha)	16,457	17,830	20,061	23,912	25,638	27,183	30,714
Production (Tonnes)	47,256	51,823	55,007	85,562	111,296	118,677	129,000
Unit price (per tonne)	53,000	59,9985	68,282	57,892	62,558	73,888	
Average yield (t/ha)	2.8	2.9	2.7	3.6	4.3	4.4	4.3
Consumption (tonnes)	293,722	190,000	343,045	410,000	520,000	540,000	548,000
Import (tonnes)	NA	202,000	398,000	398,000	408,771	417,535	419,000
Total Value (Billion KES)	2.7	0.7	0.7	1.3	0.9		
World Production (million tonnes)				470.1	486.4	491.2	496.9
World Consumption million tonnes	345.4	353.6	354.6	461.7	470.6	478.3	490.2

Source: FAO- Cereal Supply and Demand brief

National Rice Production Trend

Year	2008	2009	2010	2011	2012	2013
Area (ha)	17,830	20,061	23,912	25,638	27,183	30,714
Production (paddy tons)	51,823	54,948	85,562	111,296	118,677	129,000
Production (milled tons)	33,685	35,715	55,615	72,342	77,140	83,850
Yield (tonnes/ha)	2.9	2.7	3.6	4.3	4.4	4.3
Estimated Consumption (tonnes)	150,000	343,045	410,000	520,000	540,000	548,000
Import (tonnes)	116315	307330	354385	447658	462860	464,150

Source: Department of Crops Management, Economic review 2013

(Agricultural Economic Review 2013; National Irrigation Board Strategic Plan 2008 – 2013 and Vision 2030)

2.0 Review of the National Rice Sector

2.1 Status of rice in national policies

The Ministry of Agriculture, Livestock and Fisheries (MoALF) and the Agriculture Sector as a whole has been involved and affected by the various reforms and plans of the Government over the years. These reforms are occasioned by policies such as Poverty Reduction Strategy Paper (PRSP), Economic Recovery Strategy (ERS), Agriculture Sector Development Strategy (ASDS), Millennium Development Goals (MDGs), Vision 2030 and the Constitution of Kenya 2010 (CoK 2010) are also geared towards ensuring food security, food self-sufficiency and poverty reduction for the people of Kenya. These reforms commit the MoALF to improve service delivery and interventions that have started yielding fruits.

In cognizance of Vision 2030, ASDS, the National Food and Nutrition Security Policy (NFNS) and the Ministry of Agriculture’s Strategic Plan 2008 – 2012, the National Rice Development Strategy was developed. The strategy charted the course for rice production and development for the ten (10) years in two five year phases. However, during the implementation period in the first phase, there have emerged policy changes that warrant review of the strategy in order to accommodate these changes. This revised strategy will guide present and future efforts of the MoALF and its development partners, in providing technologies and other services for improving the livelihoods of the actors in the rice value chain.

2.2 Consumer preferences and demand projections

In Kenya rice consumers prefer aromatic rice which also has superior cooking qualities compared to other local and imported varieties. The rice annual production increased from about 73,141 tonnes in 2008 to 129,000 tonnes in 2013; while the demand rose from 300,000 tonnes to about 540,000 tonnes over the same period. The production is projected to reach 178,580 by the year 2018. However, according to vision 2030, the country should be self sufficient in rice production.

2.3 Typology and number of rice farmers, processors and traders

In Kenya rice is mainly produced by small-scale farmers in Central (Mwea scheme), Western (Bunyala scheme), Coast (Tana Delta, Msambweni areas) and Nyanza regions (Anyiko in Siaya, Ahero & West Kano schemes, Migori and Kuria sub-counties). About 300,000 rice farmers provide labour and also earn their livelihood out of the crop's production. The major rice mills in the country include, Lake Basin Development Authority (LBDA) with a milling capacity of 3.5 tonnes, National Irrigation Board (NIB) Mwea Rice Millers (MRM) 2.5 tonnes, Western Kenya Rice mills (NIB) - Ahero 3.0 tonnes and Tana and Athi River Development Agency (TARDA) with 3.0 and 7.0 tonnes per hour. Additionally there are privately owned mills such as Nice Rice Millers with a capacity of 5.0 tonnes, Mwea Rice Growers Mills (MRGM) 3.0 tonnes, Euros, Dominion farm 2.5 tonnes as well as several small mills. In the last five years of implementing the strategy, 25 rice mills were procured and given to farmers groups in the new rice growing areas.

The whole sale rice traders and processors include the, National Cereals and Produce Board (NCPB), Mwea Rice Millers (MRM), MRGM, TARDA, Dominion farms, Capwell Industries and LBDA. The retailers include supermarkets, and small scale traders in urban centers.

2.4 Gender dimensions of rice production, processing and trading

Men, women and children are involved in rice production at various levels. Male youth are mainly involved in land preparation (Ploughing, Rotavation and leveling), harvesting and transportation whereas women and youth do planting, weeding, bird scaring, harvesting, threshing, drying and winnowing. Rice marketing is done by both men and women though women dominate the local retail rice businesses.

Low adoption of agricultural technologies has been associated with gender related issues. Women hardly attend seminars or training workshops yet they are the central players in rice production. This is likely to have adverse effects on adoption and up scaling of rice technologies. Deliberate targeting

of women and youth for capacity building and technology transfer will enhance production and productivity.

2.5 Comparative advantage of domestic rice production

The locally produced rice is of high quality compared to imported rice and is preferred by consumers however the locally produced rice is expensive. There have been incidences of importation of cheap poor quality rice which is fraudulently repackaged presenting unfair competition to locally produced rice. In this regard, Kenya Bureau of Standards (KEBS) should enforce compliance of rice standards on imported and local rice. There exist unfair trade demands by rice exporting countries that sell low quality rice in Kenya for high quality locally produced crop commodities.

Increased production of rice will ensure food security and saving of the much needed foreign exchange. Local rice production, processing and marketing will improve livelihoods of rural and urban populations by creating employment opportunities for private investment and income for small-scale farmers.

3.0 Challenges and Opportunities facing National Rice Sector Development

Constraints and challenges vary with production, cropping and farming systems across the country. Like the rest of the world, the trend of rice cultivation is going towards upland rice production where water use efficiency and conservation is emphasized. The kind of infrastructure which goes with paddy rice production is expensive to most small holder farmers. The following are some of the challenges identified in rice production:-

3.1. Challenges

3.1.1 Land tenure

Land tenure system in the rice growing schemes has been made favourable to farmers although they do not own land titles but they can access credit in the present setup. For sustainable rice production the land tenure system has been addressed to provide for ownership and to allow women access to land, as they are key players in rice growing.

3.1.2 Labor scarcity due to urban migration

The migration of young energetic people from rural to the urban centers has rendered labour unavailable and expensive. Traditionally most farm families have been depending on family labour to carry out various farm operations partly to reduce on production costs and partly because it is available on demand during labour peaks. Mechanization and provision of appropriate technologies suitable for farmers would promote rice production. Investment in paddy processing, branding, product diversification and marketing activities in the rural rice growing areas would create employment opportunities to curb the rural to urban migration by the youth

3.1.3 Social Issues

In the irrigation schemes, the high prevalence of waterborne diseases such as malaria and bilharzia affects the productive ability of farmers. In addition HIV/AIDS and drug, alcohol and substance abuse have greatly affected the productive work force of the rural farming communities. There is need to provide health and nutrition education, social amenities and improved health care services.

3.1.4. Unfavorable trans-boundary trade practice

Kenya is a member of both the EAC and Common Market for Eastern and Southern Africa (COMESA) regional trading blocs. It is therefore bound by the common tariffs that apply to the member states of these trading blocs. However, there is a lot of informal cross-border trade with Uganda and

Tanzania. There is also rice seed movement across the borders which may not have undergone formal certification processes that could be detrimental to rice sub-sector development. However, the blocs present major opportunities for trade and sharing of germ-plasm. There is therefore need to have harmonized trade tariffs, and seed industry rules and regulations by the partner states.

3.1.5 Reforms of national/public rice irrigation schemes for improved rice management practices

Research and extension services in the NIB rice irrigation schemes were affected by government reforms in the 1990s, where farmers took over rice production management, which resulted to loss of genetic purity, poor agronomic practices, low productivity and inadequate credit services due to limited Public-Private Sector partnerships. These attributes were improved during the first phase of the NRDS. Currently the genetic purity, agronomic practices, production and credit services accessibility are being addressed.

3.1.6 High costs of farm inputs and machinery

Initiatives are in place to address high cost of farm inputs and machinery. These include subsidized fertilizers, seeds, machinery grants and county government efforts to address the same issues.

3.1.7 Infrastructure

In the lowland rain fed rice ecologies; poor infrastructure and uneven distribution of rice mills has led to slow increase in rice production. Infrastructure development such as roads, dams, irrigation and drainage, electricity, communication through viable public /private sector partnerships will improve the farming systems for small scale farmers hence unlock this potential resulting into poverty alleviation and economic growth. During the first phase NRDS, 25 mills were provided to the farmers' groups in upland rice growing Sub-counties.

3.1.9. Uncoordinated marketing

Poor market organization has led to market dominance by cartels and adulteration of rice. The Agribusiness and Market Development Consultative Committee has been set up to look at the ways of addressing this challenge by coordinating the various stakeholders involved.

3.1.10 Low technical capacity

There is inadequate technical knowhow on rice value chain among extension staff, farmers and processors

3.1.11. Low Mechanization

This has resulted in low inefficiency in rice production along the value chain in addition there is no policy to guide investments in this are urgent need for this policy to accelerate achievement of mechanization in the rice subsector

3.2 Opportunities

3.2.1 Potential for expansion of irrigated and rain-fed rice.

Kenya has an estimated irrigation potential of about 1.2 million hectares utilizing surface water flows, improved water harvesting and storage, and underground water resources (Water Master Plan, 2012). Most of the irrigable land is suitable for rice production, in addition to over 1.0 million hectares favourable for rainfed rice growing with water efficient varieties and innovative management technologies integrated with other crops.

3.2.2 Strong Research and Extension systems

Kenya Agricultural Research Institute (KARI) has capacity for rice research while the State Department of Agriculture provides capacity building and policy development at national level in liaison with the county governments. KARI and its partners often conduct rice adaptability trials. The scientists carry out rice breeding, agronomy, crop protection and socio-economics studies.

Field extension services have been devolved to the respective counties. The current extension approach promotes the establishment of Common Interest Groups (CIGs) to strengthen their bargaining power for better deals along the commodity value chains and develop into vibrant agribusiness entities. There is a need for strong farmers cooperative societies to complement the CIGs in accessing technology, credit, bulk purchases of farm inputs and marketing of farm produce at competitive prices thereby eliminating exploitation by the middlemen.

However, there is still need for capacity building for researchers, extension staff and farmers in rice production, post-harvest and agro-processing technologies.

3.2.3. Seed production and certification system.

The rice seed production and certification system has been established during the first phase of the NRDS; but it requires further strengthening to be in line with the best practices

4.0 Priority Areas and Approaches

4.1 Priority Ecologies

To double rice production in the next five (5) years, emphasis will be put on irrigated and rainfed lowland and upland ecologies in 21 counties spread across Central, Nyanza, Western, Coast, Rift valley, Eastern and North Eastern regions that have suitable climatic and natural conditions for expansion and increased productivity.

4.2 The challenges and opportunities in the prioritized ecologies

In irrigated ecologies, the main challenges include availability of adequate water to the rice schemes, development of new and rehabilitation of existing irrigation infrastructure. The provision of health care services, land ownership rights, environmental concerns and effects of climate change need to be addressed for the rice producing communities.

In rain-fed lowland ecologies, the major challenges encountered for increased rice production include erratic and unreliable rainfall patterns and amount; inadequate skills for both farmers and extension staff; low and poor infrastructure development including processing mills and road networks.

To achieve sustainable increase in rice production in both ecologies, there is need for provision of high quality seed; development and transfer of effective and efficient technologies; availability of other production inputs and marketing of produce, formation and strengthening of farmer organizations and management amongst other factors must continue to be addressed. Other important constraints that contribute to the low productivity include; low and declining soil fertility; diseases especially blast and viruses, and pests such as Quelea birds and rodents; high cost of production; low use of machines; low crop enterprise diversification and cropping intensities; and low adoption of appropriate production technologies.

There are planned programmes for harnessing the available water resources and opportunities to expand rice area. The government is committed to increasing food production as stipulated in its current policies and has embraced the Private-Public Partnerships approach to encourage private sector participation to develop and invest in agri-business services and commodity production enterprises.

4.3 Policies and Institutional Challenges and Opportunities

Rice has been prioritized as a key strategic crop for food security and income generation. Besides the existing policy documents on food security, such as ASDS, NFNSP and Kenya vision 2030; the government formulated the NRDS to guide the development of rice sub sector. The tradition and culture of successive sub division of family land has not favoured rice production either. The national consumption outstrips domestic production hence the need to design policies and strategies that will enhance sustainable production in order to achieve self-sufficiency and import substitution.

The NRDS will address the following: Technical capacity and institutional issues; Farm inputs and equipment; Credit support; Infrastructure development; and Marketing organization and structure improvement.

4.3.1 Technical capacity and institutional issues

- ❖ Enhanced training of researchers, extension staff and farmers on modern rice production techniques and utilization;
- ❖ Strengthen and establish training institutions to undertake capacity building in rice specific courses;
- ❖ Support and strengthen rice research and development institutions;
- ❖ Recruitment and deployment of well-trained extension officers in rice growing areas;
- ❖ Institutions involved in quality assurance such as Kenya Bureau of Standards (KEBS) and Kenya Plant Health Inspectorate Service (KEPHIS) to strengthen inspection and enforcement of regulations.

4.3.2 Farm inputs and equipment

- ❖ increase accessibility of affordable farm inputs and equipment;
- ❖ Introduce, test and develop appropriate farm tools and equipment to improve efficiency in production;
- ❖ The National Government will continue to play a key role in rice variety development, maintenance and seed production in collaboration with county governments and other stakeholders;
- ❖ Facilitate formation of farmers' groups and associations to exploit benefits of economies of scale in farm input and machinery acquisition;
- ❖ Encourage private sector partnerships in farm inputs, machinery and equipment supply.

4.3.3 Credit support

- ❖ Farmers will be facilitated to form CIGs and cooperatives and linked to financial institutions to access credit.

4.3.4 Infrastructure development

- ❖ Improvement and development of research facilities in KARI and other rice related institutions such as Universities, NIB, Regional Development Authorities, etc.;
- ❖ Improvement of roads and transport facilities, and power supply in rice growing areas;
- ❖ Enhancement of irrigation infrastructure rehabilitation of existing schemes and development of new projects;
- ❖ Strengthen management in operation and maintenance of irrigation systems and schemes;
- ❖ Provision and strengthening of health services in rice growing areas to curb waterborne diseases;
- ❖ Promotion of public private sector partnership in rice value addition ;
- ❖ Ensure environmental impact assessment and audit for large scale rice investments.

4.3.5 Marketing organization and structure improvement

- ❖ Enhance mechanisms for harmonized private sector participation and strengthen farmer organizations and CIGs in rice marketing including support services to farmers;
- ❖ Mainstream procurement and distribution of rice in the national strategic food reserves;
- ❖ Promote warehouse receipt system to rice farmers;
- ❖ Streamline rice importation by enforcing rice quality standards and proper coordination among stakeholders;
- ❖ Facilitate ICT market/price oriented technologies for fast and timely market information;
- ❖ Identify and exploit value addition opportunities.

4.3.6 Achievements and Lessons learnt from rice research and development in the first phase of the NRDS implementation

Notable achievements include,

- ❖ Development of seed certification system
- ❖ New varieties have been released and are available to farmers,
- ❖ Partnerships with development partners in research and mechanization,
- ❖ Rehabilitation and expansion of irrigation infrastructure,
- ❖ Capacity building for researchers, extension staff and farmers.

Lessons learnt include

- ❖ Farmers have positively responded to rice production with increasing participation of the private sector ;
- ❖ Farmer organization and marketing continue to be a challenge.

5.0 Vision and Scope of NRDS

5.1 Overall Goal

Improve national food and nutrition security, income generation and employment of Kenyans through sustainable rice production, marketing and utilization.

5.2 Vision

A vibrant rice sector contributing significantly to improved livelihoods, food security and economic growth.

5.3 Mission

The mission of NRDS is, to increase rice production, productivity, and competitiveness in a sustainable environment through application of appropriate technologies, client driven knowledge and information.

5.4 Strategic Objectives

The overall objective is to double rice output in both rainfed and irrigated production ecologies by 2018 through:

- ❖ Increased productivity in all rice growing eco-systems;
- ❖ Increased rice production through expansion and development of new areas;
- ❖ Improved rice pre- and post-harvest operations to reduce field and storage losses;
- ❖ Increased farmers' access to affordable credit and high quality inputs;
- ❖ Increased availability and timely access of certified rice seed to farmers;
- ❖ Enhanced provision of extension, advisory support services and technology application to rice growers;
- ❖ Develop organized rice markets and marketing channels;
- ❖ Mainstreamed and well-coordinated rice stakeholder fora at all levels;
- ❖ Strengthened human resource capacity development;
- ❖ Adoption of participatory monitoring and evaluation (PM&E) for effective and efficient use of investment resources.

Table 2: Paddy Rice Output (area, yield) from 2008 and 2018 projections by Production Ecologies in Kenya

Year	Rice Production Ecologies and Output (area, yield)									Totals		
	Rainfed Upland (NERICA)			Rainfed Lowland			Irrigated			Area (ha)	Yield (t/ha)	Production (tonnes)
	Area (ha)	Yield (t/ha)	Production (tonnes)	Area (ha)	Yield (t/ha)	Production (tonnes)	Area (ha)	Yield (t/ha)	Production (tonnes)			
2008	2,150	2.7	5,848	3,180	2.8	8,775	12,500	3.0	37,200	17,830	2.9	51,823
2009	2,070	2.0	4,160	1,665	2.1	3,450	16,326	2.9	47,397	20,061	2.7	55,007
2010	5,290	2.3	12,332	2,190	1.5	3,230	16,432	4.3	70,000	23,912	3.6	85,562
2011	4,800	3.0	14,200	2,400	2.9	6,966	18,438	4.9	90,130	25,638	4.3	111,296
2012	4,875	3.0	14,625	2,518	2.8	7,050	19,790	4.9	97,002	27,183	4.4	118,677
2013	3,000	3.1	9,330	4,000	3.2	12,800	23,714	4.5	106,870	30,714	4.2	129,000
2018	4,500	3.3	14,800	5,500	3.3	18,180	26,300	5.5	145,600	36,300	4.9	178,580

The figures presented are based on the actual rice production and cultivated area figures from 2008 in six rice producing regions of Central, Coast, Eastern, North Eastern, Nyanza and Western. The projections are based on rehabilitating existing and development of new irrigation infrastructure of rice-based Schemes to increase rice production. The rainfed rice production will be increased through expansion of acreage adopting effective agricultural water management technologies and utilization of NERICA varieties besides other high yielding cultivars. These interventions are feasible can be achieved during the planned period for increase in national rice production.

Table 3: Projections on Production and consumption- milled basis from 2013 to 2030

Year	Year difference after 2013	Est. Population at 2.7% Annual growth rate	Estimated Annual National need = Pop. x 8 (kg/person/yr)	Estimated Production (ton) at 6%	Deficit/Imports (tons) = Need - Actual prod.	Expected Annual Production (tons) to bridge the gap (10% increase)	Expected Deficit after increasing annual Production (kg) by10%)
2013	0	41,129,622	329,037	83,850	245,187	83,850	245,187
2014	1	42,240,122	337,921	88,881	249,040	115,713	222,208
2015	2	43,380,605	347,045	93,912	253,133	127,284	219,760
2016	3	44,551,881	356,415	98,943	257,472	140,013	216,402
2017	4	45,754,782	366,038	103,974	262,064	154,014	212,024
2018	5	46,990,161	375,921	109,005	266,916	169,415	206,506
2019	6	48,258,896	386,071	114,036	272,035	186,357	199,714
2020	7	49,561,886	396,495	119,067	277,428	204,993	191,502
2021	8	50,900,057	407,200	124,098	283,102	225,492	181,709
2022	9	52,274,358	418,195	129,129	289,066	248,041	170,154
2023	10	53,685,766	429,486	134,160	295,326	272,845	156,641
2024	11	55,135,282	441,082	139,191	301,891	300,130	140,953
2025	12	56,623,934	452,991	144,222	308,769	330,143	122,849
2026	13	58,152,781	465,222	149,253	315,969	363,157	102,065
2027	14	59,722,906	477,783	154,284	323,499	399,473	78,311
2028	15	61,335,424	490,683	159,315	331,368	439,420	51,263
2029	21	62,991,481	503,932	164,346	339,586	483,362	20,569
2030	22	64,692,251	517,538	169,377	348,161	531,698	(14,160)

Fig 1: Projections on production and consumption of rice by 2030

Table 4: Long term (10 years) target market price of rice

Items/ Activities	Year										
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Average Price kshs per 50Kg bag	3,500	3,500	3,600	3,600	3,800	3,900	4,000	4,100	4,200	4,350	4,500

As shown in table 5 the local market prices are expected to progressively increase from Ksh 3,500 in 2008 to 4500 per 50 kg bag in 2018 if the current upward trend in price increases continues.

5.6 Governance structure of NRDS

NRDS aims at providing an institutional framework to mobilize sufficient resources to achieve its objectives in rice production. Lessons learnt from other countries indicate that only those with proper framework have well developed rice industry. At present, various stakeholders actively involved in rice production are not well coordinated. There is need to harness stakeholders in a national forum for more interaction and collaboration to enhance implementation of NRDS.

5.6.1 NRDS organizational structure

To enhance the proper functioning of NRDS, its organizational structure headed by the Principal Secretary of State Department of Agriculture (SDA) who will spearhead implementation of the strategy. NRDSF members will be entrenched in the existing stakeholder fora.

Permanent Secretary (SDA)

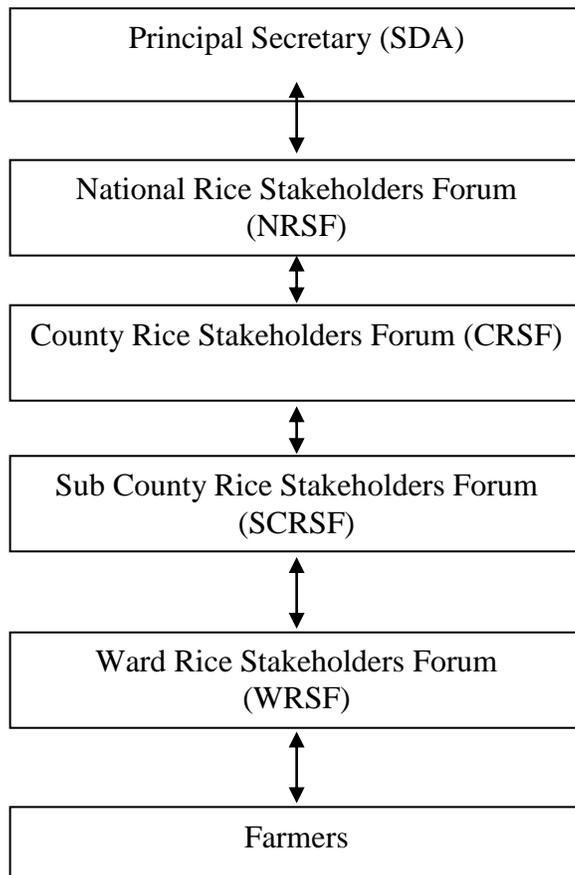
The Principal Secretary will appoint the National Rice Stakeholders Forum (NRSF) members, drawn from stakeholders in research, extension, production, irrigation, processing, and marketing. The Principal Secretary will also appoint members of the technical committee from SDA, KARI, NIB, Seed Traders Association of Kenya (STAK), Universities and Private sector The Technical Committee (TC) and Secretariat members will be drawn from above institutions.

5.6.2 Technical Committee:

The Technical Committee will meet on quarterly basis and will facilitate the implementation of NRSF recommendations by

- Providing technical and administrative guidance.
- Developing the implementation plan for NRDS
- Resource mobilization for the implementation of NRDS.
- Provide technical back stopping and feedback.
- Undertake monitoring and evaluation of NRDS activities.

Fig 2: The Organizational Structure of NARDS Stakeholders



5.6.3 National Rice Stakeholders' Forum (NRSF)

A national rice stakeholders' forum (NRSF) will be established. Members will elect the chairman of the Forum. The NRSF shall hold its meetings twice per year. The forum will prioritize identified NRDS interventions for implementation. NRSF will endeavor to collaborate with regional and international rice stakeholders and partners. It will also participate in regional and international rice development initiatives such as the Regional Rice Center of Excellence. The stakeholders' forum will be composed of but not limited to the following:

- SDA (to provide and house Secretariat);
- Researchers (KARI, NIB, Universities and others);
- Organizations dealing with rice e.g. Dominion Farms;
- Relevant Agriculture sector ministries such as Environment, water and Natural Resources, Planning, Devolution and Interior Coordination, Industrialisation and Enterprise Development;
- Farmer organizations;
- Policy makers;

- Regulatory bodies (KEBS, KEPHIS);
- Agro-processors;
- Service providers- Stockists and seed producers;
- Rice traders and merchants;
- NGOs (e.g. SACRED AFRICA etc) and CBOs;
- Credit providers [Agricultural Finance Corporation (AFC), Banks and MFIs];
- Consumer organization (apex organization).

5.6.4 Terms of reference for the National Rice Stakeholders' Forum:

- Periodical review of NRDS within the frame work of Government policies.
- Set and periodically review extension, research and capacity building agenda.
- Prioritize programs and activities of NRDS.
- Form specialized committees as need arises
- Co-opt other members as need arises
- Monitor and evaluate implementation of NRDS.
- Perform any other related responsibilities.

PRSF and DRSF: They will oversee the implementation of NRDS at the provincial and district levels. They will also perform a monitoring function.

Div RSF

The Divisional Rice Stakeholders Forum will be the implementing organ for the NRDS. As NRDS implementation proceeds its revisions will be done by the stakeholders Forum from time to time.

Agriculture Sector Coordination Unit (ASCU)

ASCU will provide linkages with the various players/ stakeholders and development partners during the implementation of the NRDS. It will facilitate collaboration and building of public/private sector partnerships.

5.6.5 Financing

The government will commit financial resources through its Medium Term Expenditure Framework (MTEF) process and development partners to meet the goals of NRDS. Budgetary allocations will give particular attention to Monitoring and Evaluation mechanisms to ensure efficient and effective implementation of NRDS.

5.6.6 Implementation strategy

Effective implementation of NRDS will depend on the active, integrated and holistic involvement of all the rice stake holders.

5.6.7 Monitoring and Evaluation

There is need for a suitable monitoring and evaluation system/ mechanism to track the implementation of NRDS activities. This includes use of results/ logical frameworks, work plans, field visits, quarterly and annual reports, mid-term review and evaluation, and end term evaluation form inputs for the next strategic plan. The government will

seek assistance on M&E from national and international partners to support efforts of promoting rice production in Kenya.

5.6.8 Resource mobilization

Considering that, increased production and productivity will be mainly achieved through irrigation development which requires high capital investment, the government and development partners are called upon to prioritize investment in this area to ensure successful implementation of NRDS. Stakeholders will be encouraged to develop competitive proposals for soliciting support and grants.

5.6.9 Linkages, collaboration and partnerships

Regional and international linkages, collaboration and partnerships (such as ASARECA, WARDA, IRRI, and JIRCAS) will be encouraged to enhance achievements of NRDS goals and objectives.

5.7 Strategic Interventions

5.7.1 Rice productivity increased by developing:-

- High yielding pest and disease resistant varieties.
- Appropriate agronomic practices for different cropping systems.
- Appropriate soil fertility and water management techniques in irrigated rice.
- Apply systems of rice intensification (SRI)
- Appropriate pest, disease and weed control technologies.
- High quality seed and supply system.
- Appropriate cropping patterns in rice farming systems.

5.7.2 Area under rice cultivation expanded by:-

- Improving and expanding irrigation infrastructure
- Increasing the area under irrigated and rain-fed rice production
- Enhance rain water harvesting for rice production
- Improving appropriate mechanization techniques for all rice operations

5.7.3 Field and post harvest losses reduced by:-

- Appropriate utilization of post-harvest technologies
- Apply improved cultural practices
- Improving harvesting, timing and post harvest handling techniques
- Developing and introducing appropriate harvesting and processing equipment

5.7.4 Farmers access credit and high quality inputs by:-

- Ensuring appropriate germplasm and variety maintenance
- Facilitating adequate production, distribution and marketing of good quality seeds.

- Facilitating adequate supply and marketing of high quality inputs.
- Ensuring affordable credits to farmers.

5.7.5 Extension, advisory support services and technology development and application improved by:-

- Providing fully functional research and extension infrastructure
- Developing, packaging, disseminating and promoting appropriate technologies
- Develop networks for information sharing among farmer organizations, extension and other stakeholders.
- Strengthening and improving farmer – extension - research linkages
- Facilitating private sector participation in technology development and transfer
- Addressing human health against malaria and water borne diseases in irrigated system
- Managing environmental resilience through optimal fertilizer utilization

5.7.6 Human resource development and productivity strengthened by:-

- Building adequate human resource for rice research, production and agro-processing.
- Creating enabling environment for motivation and retention of staff in research and extension
- Training for skills and technology development at farm level.

5.7.7 Monitoring and evaluation (M&E) by:-

- Monitoring and evaluating technology uptake
- Monitoring and establishing the status of rice in the country
- Monitoring and promoting production and value addition chains
- Establish feedback mechanisms and interactive platforms.

6.0 Strategies for the Sector

6.1 Value chain analysis

There is need to determine all stages of rice production, processing and marketing in order to address the gaps.

6.2 Variety development and maintenance.

The research scientists will acquire germplasm from international rice research institutions for variety evaluation and release. These varieties together with germplasm currently available in the country will be used to develop new ones for different agro-ecological zones.

6.3 Variety Release Mechanism

Varieties will be developed and evaluated through National Performance Trials (NPT) by the National Variety Release Committee (NVRC). The Minister for Agriculture will then release them officially for gazettelement before being availed for production.

6.4 Seed production and distribution

Breeder's seed

- Variety development will be agro-ecological zone specific, but seed multiplication will be in areas with low biotic stresses.
- Breeder seed will be developed by researchers and maintained in the research institutions.
- Foundation seed will be produced and maintained in the research stations by breeders/scientist
- Certified seed will be produced by seed merchants, and farmers under the supervision of KEPHIS and rice scientists.
- Develop and strengthen an integrated formal/informal community based and quality assured seed production system
- The certified seed will be sold to seed stockists in rice growing areas as per projected requirements for ease of accessibility to farmers.

Table 5: Seed Multiplication Procedure

Seed type	Research centers	Quantity	Responsible
Breeder	KARI-Kibos KARI-Mwea MIAD, Baobab Co. ltd	1 to 10 kg	Researchers KEPHIS
Foundation seed	KARI-Kibos KARI-Mwea MIAD, Baobab Co. ltd	100 kg	Researchers KEPHIS
Registered seed	KARI-Kibos KARI-Mwea MIAD	3000 kg	Researchers KEPHIS Seed merchants
Certified seed	KARI-Kibos KARI-Mwea, MIAD, Baobab Company in Coast, Seed Merchants	As per market requirement	Seed merchants, Farmers, seed growers, Researchers & KEPHIS

6.4 Requirements based on the above perspectives and current situation

6.4.1 Infrastructure

- Seed storage facilities
- Temperature regulated stores for bulk seeds
- Seed storage freezers for breeders seed
- Adequate area for seed multiplication in the research centers
- Adequate area for varieties evaluation
- Fully equipped laboratories for seed analysis
- Seed processing equipments
- Rice harvesting machines

6.4.2 Human resource requirements

Table 6: Number of Researchers, Technicians and Extension Workers in 2008 and Targets in future

Year	Agricultural Researchers with MA or PhD.			Research Technicians			Extension Workers		
	Total	Rice specialists (part time)	Rice specialists (full time)	Total	Rice specialists (part time)	Rice specialists (full time)	Total	Rice specialists (part time)	Rice specialists (full time)
2008	20	12	8	48	20	28	817	685	132
2013	32	16	16	60	26	34	899	754	20
2018	56	22	34	84	32	52	989	829	160

6.4.3 Institutions

Table 7: Institutional Roles

Activity	Institution
Variety Development	KARI/NIB (in collaboration with International Research Institutions)
Variety evaluation	KARI & NIB, Universities with SDA and farmers as observers
Breeder seed	KARI/NIB /Public Private breeders, KEPHIS
Foundation seed	KARI/NIB/Public/Private breeders, KEPHIS
Registered seed	KARI & NIB, Public, Private Sector, KEPHIS
Certified seed	Seed merchants, NIB, MOA, KARI, KEPHIS

6.4.4 Private seed sector development

Private seed merchants will be encouraged to participate as the rice industry develops.

6.5 Fertilizer Marketing and distribution

Table 8: National Fertilizer Requirements

Fertilizer type	Amount/ Ha (kg)	National requirements (tons)		
		Year 2008	Year 2013	Year 2018
Production Area (Ha)	-	17839	35660	53490
DAP	185	3300	6597	9896
SA	309	5512	11019	16528
CAN	247	4406	8808	13212
MOP	185	3300	6597	9896

6.6 Post Harvest Requirements

Technologies for each step:

- Cutting - Sickle, Small scale harvesters may be required
 - Threshing - To develop small motorized threshers.
 - Winnowing - To develop small scale motorized winnowers.
 - Drying - To develop small scale driers
 - Storage - To construct seed storage facilities.
 - Milling - To construct driers for paddy rice in the rice growing areas
 - Milling - The private entrepreneurs will be encouraged to install improved rice mills
 - Milling - Provide Pass mills in the rice growing rural areas.
 - Milling - There is need to introduce mobile mills for newly open rice Growing areas
 - Grading - Seed and paddy rice grading equipment will be required
 - Packaging - Rice seed and milled rice will be packaged in appropriate materials
- Development of the above equipments will be done by National Rice Stakeholders Forum in collaboration with Agriculture Technology Development Centers (ATDCs), KIRDI and *jua Kali* sector.

6.7 Marketing Vision

Development of competitive marketing channels will be enhanced to play a key role in stimulating rice production.

6.7.1 Targeting Market price and quality

- Prices will be determined by forces of demand and supply, variety and quality of milled rice. In the event of oversupply, NRSF recommend that the Government buys excess for the National Strategic Food Reserves.
- The NRSF will liaise with government to address the marketing constraints that distort rice supply and demand.
- Private sector will be expected to play a key role in rice trade and marketing

- Variety Development will be oriented towards consumer demand to enhance domestic market.
- Quality of locally milled and imported rice will be regulated in accordance with international and national food/rice standards and enacted by KEBS.

6.8 Irrigation and investment in water control technology

- Rehabilitation and modernization of infrastructure of the existing schemes and the newly expanded areas.
- In view of the high cost of pumping water, gravity irrigation systems will be given priority in all the existing and upcoming rice schemes.
- There will be initiatives to increase water resources availability for irrigation and other uses by water harvesting and development of water storage infrastructure.
- There will be interventions to improve on water use efficiencies at various levels such as canal lining and adequate management including operation and maintenance of all flow control and measurements structures.
- There will be initiatives to build capacity in irrigation and drainage research and water management.
- Enhance capacity building and training irrigation water users association (IWUAs) to effectively fulfill their mandate to sustainably manage, operate and maintain their irrigation infrastructure.

6.9 Access to and maintenance of agricultural equipment

- Land preparation- Private entrepreneurship will be encouraged to participate in ploughing and rotavation.
- Farmers will be introduced to animal draft implements for puddling and ploughing.
- Research on land preparation equipment involving key stakeholders will be continuous.
- The private sector in collaboration with scientists will be encouraged to design, fabricate and repair land preparation, harvesting and post harvest equipment.

6.10 Research, Technology Dissemination and Capacity Building

Research, technology dissemination and capacity building will play a key role in realization of the NRDS strategic objectives.

6.10.1 Technology generation and access to knowledge

- Technology generation will be spearheaded by National Technology and Research institutions namely, Universities, Polytechnics, KIRDI, KARI and NIB.
- Participatory research will be encouraged where farmers and extension personnel will be involved.
- Annual findings will be presented in joint research, extension and farmer conferences /committees and published documents availed to the stakeholders.
- It is recommended that growers manual be updated regularly as new technologies emerge.

- Field days and demonstrations will be held every season and whenever necessary.
- Bulletins print, electronic media and ICT will be used to disseminate new technologies.

6.10.2 Genetic resources conservation and use

Research scientists will acquire germplasm from international rice research institutions for varietal evaluation and release. New varieties will also be developed from the locally available germplasm and land races through plant selection and hybridization.

6.10.3 Soil health/fertility management

- Soil health/fertility trials will be carried out in all rice growing areas to determine fertility amendment methods/rates.
- Soil water relationship research will be conducted in all the rice growing areas.
- Appropriate crop rotations will be applied to improve soil fertility.
- Plant water requirement research will be done for water use efficiency
- Disseminations of appropriate soil and water technologies will be taken to farmers.
- Demonstrations to be undertaken with the farmers on Soil and water management.

6.10.4 Advisory Services – extension/NGOs/Agribusiness

- Advisory services will be provided through extension service providers.
- Training on rice production, processing and marketing will be done to farmers, common interest groups and farmer field schools.
- Pamphlets, brochures and video messages will be developed for learning by rural communities.
- Encourage farmer to farmer extension.
- Strengthening of Agriculture extension desks to provide information to farmers.
- Strengthening of Agricultural training centres to provide training to rice production, processing and marketing stakeholders.

6.10.5 Producer Organizations

Farmers will be facilitated to form producer organizations to achieve economies of scale, ease access to services such as extension, market information and markets.

6.10.6 Access to credit/agricultural finance

Farmers will be facilitated to access affordable credit through their associations.

6.10.7 Capacity building

- There will be capacity building of human resource for research and extension workers.
- There will be capacity building of stakeholders along the value chain in all techniques related to rice production, processing and marketing.

- Capacity building for input stockists and agro-processors for value addition chains.

7.0 Conclusions and Recommendations

- It is important to note that rice will continue to play a vital role in food and nutrition security in Kenya.
- There is need to undertake value chain analysis in order to determine the gaps and develop interventions to address them.
- Efforts therefore need to be made to address challenges facing rice by increasing investments in research and development.
- The importance of seed as a key input in production cannot be overemphasized; hence deliberate efforts have to be made towards production and distribution of clean certified seed to farmers.
- A system for production and distribution of seed needs to be established so as to acquire the necessary quantities to farmers.
- Extension activities on technical guidance, seed production and distribution, awareness creation, facilitation and establishment of threshers and rice mill among others needs urgent attention for increased rice production.
- Expansion and improvement of existing schemes together with development of upland and wetland areas will go a long way in increasing the area under production.
- Farmers and farmer organizations together need to be empowered to undertake production, processing and marketing of rice.
- It is important to address the issue of post harvest management to reduce losses and improve quality of rice.
- There is need for financial support for technology development and dissemination/extension services, capacity building and provision of mobile mills.
- To support farmer capacity to acquire seed and other inputs there is need to establish a revolving fund for sustainability.
- In order to attract the youth into rice farming and also increase productivity of the aged there is need to reduce drudgery by introducing small-scale mechanization equipment and machinery.
- The proposed NRDS requires capital investment for its successful implementation, in this respect, the public-private sector partnership and development partners collaboration mechanisms will carry out resource mobilization with target of at least US\$25 million will be imperative for the first five years.