STRATEGIC RESEARCH DIRECTION FOR WATER UTILISATION IN AGRICULTURE

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South Africa Vision 2025 of Medium Term Strategic Framework

- People are united in diversity while appreciating the common interest that bind them together
- Conditions have been created for full participation of women
- Effective programmes exist to reduce poverty and protect the most vulnerable in society
- Beneficial and sustainable use is made of human resources, natural resources and modern technology
- Common interests are promoted by investment and competitive returns for the private sector

Anticipating and Addressing Strategic Issues and Trends – Green Paper, 2009

- Long-term availability of water
- Energy consumption and production
- Conservation, biodiversity, climate change mitigation and adaptation
- Food security and sustainable rural development
- Innovation, technology and equitable economic growth
- Poverty, inequality and the challenge of social cohesion
- National health profile and developmental health care strategies

Reports by Departments of Agriculture and Health, 2008

THE MERCURY Wednesday October 29 2008 3

SHORTFALL CONTRIBUTES TO HIGH PRICES

'SA is not producing enough food'

LYSE COMINS

SOUTH Africa's shortfall in food production, which has not kept pace with population growth over the past two decades, has been a contributing factor in part behind the sharp food price increases in recent years.

And, globally, food prices have been driven up because of rising consumer spending power in developing countries, the demand for grain for biofuels and animal feed, and poor climatic conditions. A reduction in the export of strategic grain crops, rising input and fuel costs, and a growing trend towards a few producers dominating the food chain have all fed international price hikes.

This was revealed in the fourth Food Cost Review, a report released by the National Agricultural Marketing Council and the agriculture department this week. The review calls for sweeping government intervention to address local production problems, which have been cited as the major cause of the local food price increases.

Poor investment in farming infrastructure, storing grain reserves for harsher farming environments expected because of climate change, and food stamps for the poor were among the recommendations made by the marketing council.

Food inflation closed at 13.5% in December 2007 and rose to 17.8% in June 2008.

Several factors contributed to the meagre performance of the agricultural sector including adverse climate conditions, availability and quality of water, lack of investment, unfavourable trade policies, performance because of land reform, low profitability because of higher input costs and insufficient advances in increasing productivity.

The council said: "Production is struggling to keep up. Total agricultural production increased by only 10% between

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1991 and 2007. At the same time population growth from 1993 to 2007 was 32% (not taking into account illegal immigrants in the country). Population growth has outstripped agricultural production, in particular field crop production, by far.

"In addition, increasing per capita incomes contributed to the increasing demand for food.

The report noted that the impact of climate change was expected to hit developing and import-dependent countries harder as they would see a decline in production, while developed countries were expected to experience an increase in production.

"It is also expected that there

SA's nutrition dangers highlighted

Food insecurity and high rates of malnutrition, coupled with high food prices, remain the biggest threat to nutrition in Africa, says Health Minister Barbara Hogan.

Opening the 30th session of the Codex Committee on Nutrition and Foods for Special Dietary Uses in Cape Town yesterday, she welcomed a proposal for new work to develop a standard for processed, cereal-based foods for malnourished infants and young children.

"Food insecurity, high rates of malnutrition, coupled with high food prices, are the biggest threat to nutrition in the region. Due to these challenges, we would truly appreciate the development of such standards to control the emergence of products that would have adverse effects on children, especially those that are already immuno-compromised," she said.

South Africa had effectively, and innovatively, implemented a food-fortification programme. Through government regulations, all millers were now required to add specified amounts of vitamins and minerals to all maize meal and wheat flour produced in the country.

Bread and maize meal were the most frequently consumed foodstuffs in South Africa and these products were therefore the best vehicle to deliver the required micronutrients to many who for one or other reason could not consume an adequate diet.

There were other nutrition programmes, like vitamin A supplementation for children, which were having a significant impact in improving the population's nutritional status.

Participation in the committee's sessions enabled South Africa to revise existing legislation to be in line with Codex food standards, she said.

Hogan expressed sincere gratitude as a country to co-host the 30th CCNFSDU session.

"I believe there are 300 delegates, representing 70 member countries and 27 international organisations. This makes this gathering a truly global forum ...

"We are also encouraged to know that by co-hosting this meeting in our country, more African countries are as a result participating in this meeting." – Sapa

Strategic Context for Research

- Previously taken-for-granted aspects of daily life – food, water, energy, predictable weather – seem less and less reliable.
- Our diminishing resources and growing waste underlie a host of economic stresses and reflect environmental and social imbalances that all but ensure that, without significant change, these problems will worsen.
- The first imbalance concerns nature's capacities to continue regenerating resources and providing the "eco-services" upon which human life depends – clean water, breathable air, fertile soil, pollination and stable climate

Peter Senge (2008)

Strategic Context

- Biggest share of water used in agriculture (i.e. rainwater, surface water and groundwater) for relative low value production
- 1.3 million households in small-scale agriculture
- 34.5 thousand households in medium to large-scale agriculture
- 48.5% of population live below poverty line with 70% in rural areas: 15-16 million people
- 41% of households food insecure at income of R800 per month: 19-20 million people

Key Drivers of Research

Significance of agriculture in the economy

- Everybody in society consumes food:
  - Technological progress and entrepreneurial initiative has widely distributed benefits
- Agriculture is the key to rural development
  - Water use and production analysed as a value adding process
- Research raises the productivity of resources:
  - Improve competitive advantage in global economy

Ed Schuh (2003)

Key Drivers of Research

- Improving knowledge of the technical processes of production of food and fibre crops
- Improving knowledge of management processes by people who are using water in the food value chain
- Improving knowledge of natural processes and people-induced impacts of water resource use

Research Portfolio Scope

People centred research and development on water use in agriculture.

Diverse group of subsistence, emerging and commercial farmers using water.

- Irrigated agriculture
- Dry-land agriculture
- Woodlands and forestry
- Grasslands and livestock watering
- Aquaculture and fisheries

Point of departure of applied research:

Real-life problems experienced by primarily water users and related organisations

Research Portfolio Objectives

Create knowledge, utilise opportunities and solve practical problems with objectives to:

- Increase biological, technical and economic efficiency of water use
- Reduce poverty through water-based agricultural activities
- Increase profitability of water-based farming systems
- Ensure sustainable water resource use through protection and reclamation practices
  - **Improve food security and livelihoods of people dependent on agriculture**

Water Utilisation in Agriculture Business Plan 2010/11

- Total number of research projects: 44
- Total investment: R129.8 million
- Annual budget 2010/11: R24.3 million
- 50% of projects involve on-farm research or participatory action research
- 40% of projects involve development of guidelines, training material or technology exchange




WATER USE FOR IRRIGATED AND RAIN-FED CROP PRODUCTION, AGRO-FORESTRY, AQUACULTURE AND LIVESTOCK WATERING

THRUST 1 : Water Utilisation for Food and Fibre Production

Programme 1 : Water-efficient production methods in relation to soils, crops and technology in rain-fed and irrigated agriculture

RESEARCH FLOW

- Generally applicable methods to estimate water use of crops
- Technologies for efficient irrigation scheduling
- Water use of indigenous food crops, irrigated pastures and crops for bio-fuels
- Water use and nutritional value of food crops
- Water use of crops with remote sensing/satellite imagery

Programme 2 : Fitness-for-use of water for crop production, livestock watering and aquaculture

RESEARCH FLOW

- Groundwater quality for livestock and human use in rural villages
- Use of greywater for food production in peri-urban areas
- Guidelines for management of water quality in farm irrigation dams for aquaculture
- Use of irrigation water contaminated with micro-organisms, food safety precautions and water treatment options

THRUST 2 : Water Utilisation for Fuelwood and Timber Production

Programme 1 : Water-efficient production methods and systems in agro-forestry, woodlands and forestry plantations

RESEARCH FLOW

- Water use of staple food crops and trees in agro-forestry systems
- Water use of indigenous trees
- Water use, biomass production and economic value of indigenous trees in natural and plantation conditions
- Re-establishment of trees in degraded landscapes for employment creation and carbon credits

THRUST 3 : Water Utilisation for Poverty Reduction and Wealth Creation

Programme 1 : Sustainable water-based agricultural activities in rural communities

RESEARCH FLOW

- Techniques and practices for RWH & C with homestead food gardens
- Approaches and guidelines for revitalisation of small holder irrigation

- Upscaling of RWH&C to communal croplands and grasslands
- Water use security and skills development for empowerment of woman for household food security
- Adaptive research on good management practices and training material for farmers and extension officers
- Revitalisation of rural aquaculture and fisheries

Programme 2 : Integrated water management for profitable farming systems

RESEARCH FLOW

- Soil water management programme for rain-fed farming
- Baseline study on contribution of aquaculture to rural livelihoods
- Development and integrated application of models for water management at field, farm, scheme and catchment scale

- Technology exchange and decision support for efficient irrigation water use through e.g. water measurement and drip irrigation for energy saving
- Water footprint and food value chain analysis for mainstreaming of emerging farmers
- Whole-farm modeling for optimisation of water use and entrepreneurial development

THRUST 4 : Water Resource Protection and Reclamation

Programme 1 : Sustainable water resource use on irrigation schemes and within river catchments

RESEARCH FLOW

- Impact of salinity on crop production; and on sustainability at farming and regional economy level

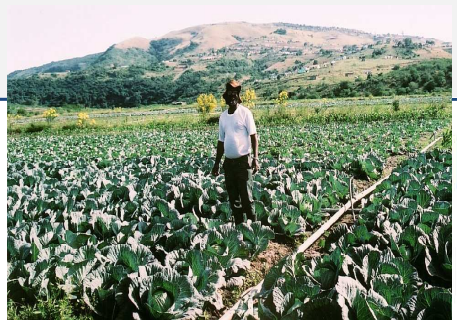
- Guidelines for management of salinity
- Development of GIS to monitor salinity status on irrigation schemes
- Technical standards and economic viability of drainage systems at farm and irrigation scheme level

Programme 2 : Impact assessment and environmental management of agricultural production

RESEARCH FLOW

- Knowledge review and modelling of non-point source pollution

- Rainfall near forecasting and early warming systems for agricultural production
- Climate change and vulnerability assessments with appropriate adaptation strategies for rain-fed and irrigated farming
- Rain-fed crop and livestock production for biogas generation
- Impact of agri-chemicals on water resources

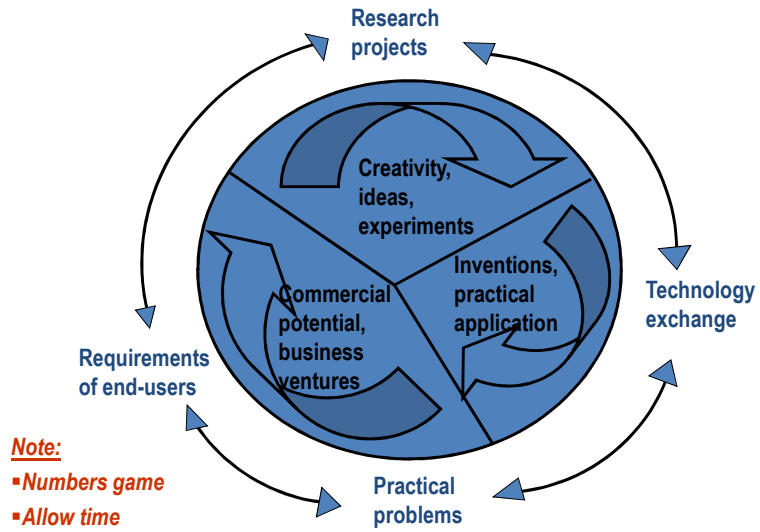


WATER, FOOD, PEOPLE AND DEVELOPMENT

Future Research Focus

- Water use & nutritional value of crops
- Water quality & micro-biological food safety
- Water use & economic value of indigenous trees
- Water use & restoration of degraded lands for carbon sinks
- Water use security, empowerment & poverty reduction
- Good practices & training material for water management
- Up-scaling of rainwater harvesting to croplands
- Food value chains in rain-fed & irrigated agriculture
- Guidelines with GIS monitoring of salinisation & drainage
- Impact assessment of pollution by agricultural chemicals
- Vulnerability assessment & adaptation to climate change
- Crop-& grassland systems for renewable energy

Taking Research into Practice: The Innovation Cycle



Note:
- *Numbers game*
- *Allow time*
- *Encourage involvement*

Key Realities and Requirements for Research Application

- Science based innovation not the most reliable and predictable source of new knowledge
- Investment in applied research is a risky undertaking
- Long lead time or time span
- Relative low success rate
- Main requirements:
  - High quality research in successive projects
  - Follow research with technology exchange
  - Core group of researchers, managers and end users involved in research processes
  - Individual drive, team effort and organisational continuity

Key Contributions by Research Based Knowledge Creation

- Increasing the productivity of rainwater and irrigation water for crop and livestock production
- Uplifting rural economies through commercial food production
- Quantifying the water footprint in food value chains
- Eradicating hunger and reducing poverty
- Improving nutrition and health
- Generating alternative sources of renewable energy
- Preventing soil and water degradation and pollution
- Adapting farming systems to climate change

THANK YOU

Notes: