ISSUE 136 Winter 2009

THE EXCHANGE

DEDICATED TO SHARING KNOWLEDGE AND RESOURCES

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Adapting to and Mitigating the Impacts of Climate Change

Raising the Voice and Practice of Men and Women Farmers and Pastoralists (Villains, Victims, Victors?)

By Constance Neely, Ph.D., Vice President of Advocacy, and
Terry Wollen, D.V.M., Director of Livestock Advocacy for Heifer International

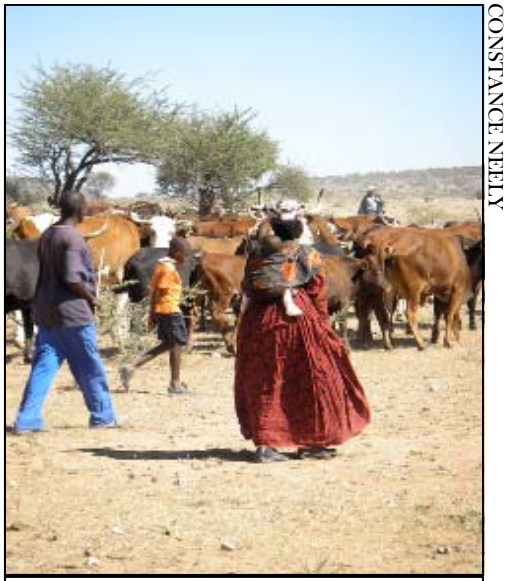
Climate Change – What is it and what's the threat?

When a region experiences any long-term significant change in the "average weather," this event is climate change. Global warming, a recent warming of the Earth's lower atmosphere, is the result of an enhanced greenhouse effect, or holding in heat, attributed to significantly increased concentrations of greenhouse gases (GHGs), particularly carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Global warming is climate change. This increased concentration of GHGs results from anthropogenic activities, also known as the influence of human activities.

Climate change and variability are long-term environmental issues and pose serious threats to vulnerable and impoverished people worldwide. While predictions vary by geographic area, it is anticipated that, in many cases, there will be reduced growing seasons and yields; increased storms, droughts and floods; loss of arable land; further reductions in water availability and quality; changes in human and animal disease patterns; and increased famines and malnutrition.

If changes are not put in place, these predictions indicate greater political instability, mass migration, increased tensions over diminishing water, energy and natural resources, and increased conflict over injustices related to who is causing and who is suffering from global climate change.

There is no doubt that impoverished people will suffer the greatest consequences, and smallholder farmers and pastoralists, who are dependent on the seasons, will face unprecedented challenges. The impacts will affect women and men disproportionately, because as farmers and energy providers, women will be more deeply affected. Are



CONSTANCE NEELY

Using humane animal handling techniques and holistic grazing, a Herero family herds cattle in Namibia.

smallholder farmers and pastoralists climate change victims?

Agriculture's role in climate change and the growing demand for food production

Agriculture is a major contributor of GHGs, accounting for 14 percent of global emissions, and, when the conversion of forests for agriculture use is added, that figure rises to 31 percent. Agricultural emissions stem predominately from the use of fossil fuels, land use conversion, and livestock. Emissions from livestock account for more than half of agricultural emissions. So, is agriculture a climate change villain? Are livestock the most villainous?

What is less clear in the numbers above is that there is quite a difference in the overall emissions occurring from industrial and small-scale agricultural or pastoral practice.

Livestock cannot just go away—nor should it. Approximately 1 billion resource-poor people depend on livestock for at least a portion of their livelihood.

Meanwhile, there is a global population to feed. It is predicted that there will be more than 9 billion humans by 2050, requiring a 70 percent increase in food production. In the past year, the number of hungry people reached 1 billion, while 2 billion suffer from malnutrition, making 2009 a benchmark year, in the most negative sense.

There is a bright side, in which men and women farmers become the victors – a piece of the solution

Better land management and sustainable agricultural practices have the capacity to mitigate and reduce emissions by 88 percent of the current agriculture annual emissions, with the majority of that shift coming from developing countries.

The Intergovernmental Panel on Climate Change (IPCC) has reported that the key technical options, addressing approximately 90 percent of mitigation potential, include improved cropping and grazing land management and the restoration of degraded lands, as well as organic soils. The majority of this is related to capturing carbon in the soil.

RAINBOW BROWN

In the Meru District of Tanzania, highly innovative Zadock Kitomari and his family have six goats, one cow and multiple fish ponds. They also maintain a tree nursery; grow maize and vegetables; practice composting and waste recycling; and conduct research on grass nutrition.

RAINBOW BROWN

Even more than forests, soils represent the earth's largest carbon sink that can be controlled and improved.

Further good news is that many practices that mitigate the effects of climate change also provide a means for adapting to the climatic vagaries. Building up soil organic matter not only sequesters carbon (mitigation), but it also increases productivity, water infiltration, and water holding capacity, which enhances agricultural resilience and provides a means for farmers and pastoralists to better adapt to droughts and floods. Some data show that a 1 percent increase in soil organic matter expands the water holding capacity by 10,000 liters per hectare—ensuring the water is where it can be used.

A Systems Approach to Good Practice

For smallholder farms, the best approach is integrated farming systems using agroecological approaches including crops, livestock and trees. These systems bring together practices such as managing manure; composting; mulching; reducing tillage; maintaining soil cover; diversifying crop and livestock species; and adding multipurpose tree species, among others. Additionally, biogas generators and energy-efficient stoves can decrease emissions from livestock waste and wood burning.

Evergreen Agriculture

As promoted by the World Agroforestry Center, combining conservation agriculture, built on principles of limiting soil disturbance; maintaining a permanent organic soil cover; and diversifying rotations of annual crops and plant associations of perennial crops, with trees (Conservation Agriculture with Trees -CAWT) is proving to be an important way to build carbon in soil and biomass, maintain soil moisture, and increase nutrients and productivity.

One phenomenon being replicated on a large scale and sweeping Sub-Saharan Africa is conservation agriculture with the *Faidherbia albida*, an indigenous tree that has nitrogen-fixing properties and actually goes dormant and sheds its leaves in the early rainy season. This makes it highly compatible with food crops, so there is no competition for light, nutrients or water during the growing season.

Grazing Land Management - What about pastoralists?

Because of the extensive nature of grasslands, its carbon stock is significant. Grasslands cover approximately 30 percent of the earth's ice-free land surface and 70 percent of its agricultural lands. Fifty-nine percent of the total carbon stock held in Africa is in the drylands, and pastoralists manage about 40 percent of the continent.

Unfortunately, the majority of grass-

land and rangelands suffer from soil degradation. Grazing land production and its carbon storage can be enhanced through efficient grazing practices. For maximum efficiency, it is important to:

a. stimulate grasses to grow vigorously and develop healthy root systems
b. feed both livestock and soil biota
c. maintain 100 percent plant and litter cover 100 percent of the time
d. rekindle natural soil-forming processes
e. provide adequate rest from grazing to allow plants to fully recover

In some scenarios, as growing degree days decrease, certain crops will no longer be grown; thus, more land may be used for livestock-based systems.

Can we reduce methane emissions from livestock?

While we can use livestock to build soil organic matter and biomass productivity, it is also possible to decrease livestock emissions through their diet and manure management. Ruminant species belch methane during the normal digestion process, and an additional portion of atmospheric methane comes from the fermentation of moist manure stockpiles. The key to reducing methane is improving livestock nutrition, which cuts down on exhaling methane and leads to the improved management of manure lagoons.

Local Food Systems

The most obvious way that small, sustainable farms help reduce dependence on fossil fuels is by selling their products locally. A shorter distance for food to travel decreases the fuel needed to transport it. The benefit extends to more healthy foods for local populations through practices such as farm-to-school programs. Sustainable farming practices also have the potential to reduce fossil fuel dependence by eliminating wasteful production practices.

What we don't do can be as important as what we do

Transporting feed for animals and food for humans, fueling machinery, and agro-chemical production and application are the heavy hitters of fossil fuel in industrial agriculture. The largest use of energy is, by far, in the manufacture and distribution of fertilizers and pesticides. By applying organic and sustainable practices, and decreasing our dependence on these harmful methods, we will reduce the emissions associated with agriculture on any scale.

Another big contributor of GHGs is the burning of crop residues and grasslands. Burning releases a significant number of globally-relevant gases (N_2O, CO_2 and CH_4), as well as photochemical smog, hydrocarbons, and aerosols. Biomass burning significantly reduces soil organic carbon (SOC) in the soil surface, thus reducing soil quality.

Heifer's Healthy Hoofprint

Heifer is taking climate change very seriously. In 2008, Heifer introduced a research project called the "Heifer Healthy Hoofprint," which was piloted in seven countries in four regions to determine if agroecological practices that include livestock improve the environment, as well as socially and economically benefit farm families. Data collected thus far indicate a positive trend, showing that these farming systems both sequester carbon and improve livelihoods.

JIM HOEY

Ecuadorian youth take soil samples as part of the pilot study on Heifer's Healthy Hoofprint.

HEIFER INTERNATIONAL

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The Heifer International Exchange Newsletter is the quarterly publication of Heifer International dedicated to sharing knowledge and resources on sustainable small-scale agriculture and appropriate technologies in developing areas.

The ideas and opinions expressed are those of the authors, not those of Heifer International as an organization.

All readers are invited to contribute. We welcome your sharing of ideas and experiences with us. Subscriptions are free; donations are greatly appreciated.

There is truth to the saying that small farmers are cooling the planet. Over the next five years, Heifer will be expanding this work to all of its project countries.

Creating solutions with appropriate training and investment

Climate change may prompt us to more rapidly put in place good agroecological practices that have been encouraged for more than 20 years. This will require a focus on the improved management of livestock systems. Further, major investments must be made in agricultural adaptation and mitigation to ensure that farmers and pastoralists have the resources necessary to implement good practices, as well as the policies to support them. Food security, poverty reduction, and climate change mitigation and adaptation must go hand-in-hand, and farmers and pastoralists should be positioned to lead us in a sustainable direction.

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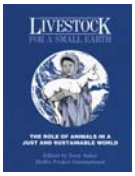

Livestock for a Small Earth

Heifer International
Edited by Jerry Aaker

A guide for creating and maintaining successful development projects in rural areas of the world, based on animal agriculture, careful attention to existing ecosystems, and the unique concept of "passing on the gift." The book presents practical insights gathered by Heifer International during more than 50 years of work in dozens of countries and states, specific recommendations regarding procedures and forms, and an extensive bibliography and reference list. First-person stories from aid recipients themselves tell of hopes and accomplishments, bringing to life the theories and principles of responsible development. 111 pages, 1994. Available in English only.

Copies are available free of charge from Heifer International, while supplies last.

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PILLARS Credit and Loans for Small Businesses

Excerpt adapted from Footsteps, Tearfund, No.80, September 2009.

This PILLARS Guide encourages good practice in record keeping, planning and maintaining savings and credit groups. Through discussions and Bible studies it aims to give people an understanding of a variety of ways of obtaining either credit or loans and establishes good practice in record keeping and planning. This Guide should be used to study the issues involved before establishing either informal savings or credit groups or obtaining loans from outside organizations. Tearfund books can be downloaded free.

Web site: www.tearfund.org/tilz

Indigenous Knowledge for Disaster Risk Reduction: Good Practices and Lessons Learned from experiences in the Asia-Pacific Region

Excerpt adapted from Spore, no. 143, October 2009.

For centuries, local communities have prepared for and responded to natural disasters using indigenous methods passed on from one generation to the next. This publication documents a collection of 18 indigenous practices which were developed over time in the Asia-Pacific region. They helped communities have advance warning or lessen the impact of earthquakes, cyclones, drought, landslides, river bank erosion and tsunamis. ACP case studies include how villagers in Singas, Papua New Guinea, cope with floods and how indigenous knowledge saved lives during the 2007 Solomon Island tsunami. The report can be downloaded from UN/ISDR.

Web site: http://www.unisdr.org/asiapacific/publications

LEISA's Farm

Excerpt adapted from LEISA, No. 25.2, June, 2009.

Did you know that certain Australian acacia species have tasty and nutritious seeds that can be stored for many years, thus serving as famine reserve food? You can read all about it on our **blog**, LEISA's Farm. There you can also find many other interesting items related to sustainable agriculture and sign up to receive new posts in our inbox.

Web site:
www.familyfarming.typepad.com

Peasant Seeds, the Foundation of Food Sovereignty in Africa

Excerpt adapted from Spore, no. 141, June 2009.

A workshop organised by national producers' association Coordination Nationale des Organisations Paysannes du Mali (CNOP) provided an opportunity for an unprecedented exchange of experiences among farmers on the subject of seeds for small-scale producers. This report sums up the main points made by the participants who came from four continents. Designed as a presentation tool, it also includes a CD containing audio recordings of the talks, presentations of the slideshows and video sequences. Copies are available for $10 or free for non-OECD countries, plus shipping and handling.

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MATERIALS FOR EXCHANGE READERS

Kanu, Saidu; Paul Tengbe, Thomas R.A. Winnebah, and Pamela Konneh.
"Promoting Urban Agriculture in Post-Conflict Greater Freetown Area, Sierra Leone."
Urban Agriculture.
January 2009. no. 21, p. 19-21.

Following civil war, the Freetown population increased, as a large number of rurally displaced persons opted to remain in the city. Select this article for information on the importance of urban agriculture as a source of food, income and employment in Freetown.
■ *Request No. 13601*

Pimber, Michel.
"Women and Food Sovereignty."
LEISA.
September 2009. no. 25.3, p. 6-9.

The link between women and food sovereignty is easily found in the fact that women are responsible for most of the labor in agricultural food production and commerce. This article explores the connection between women, food sovereignty, and this movement.
■ *Request No. 13602*

Mumero, Mwangi.
"Rift Valley Fever Threatens Kenya."
African Farming.
July/August 2009. p. 13-14.

Climate models that track irregular sea surface temperatures in the Indian and Pacific Oceans warn that Rift Valley Fever 'may strike again' soon. Select this article to learn more on the Nairobi-based International Livestock Research Institute's (ILRI) warning and lessons learned from previous outbreaks.
■ *Request No. 13603*

Lowore, J. and Bradbear, N.
"Modern Hives or Modern Ideas?"
Bees for Development.
March 2009. no. 90, p.2-4.

In this articles, Bees for Development Journal examines why bee projects continue to focus on hive delivery, although evidence suggests this approach may not result in long-lasting or significant benefits.
■ *Request No. 13604*

"Changing Farming Production in Africa to Adapt to Climate Change."
Farm Radio International.
August 2008. pkg. 84, script 14.

Climate change presents African farmers with new challenges, and many African farmers have found strategies to adapt. Select this transcript to read the interview with agricultural extension officer Kokou Bosso.
■ *Request No. 13605*

Mabeza-Chimedza, Ruvimbo.
"Improving Food Security."
Footsteps, Tearfund.
December 2008. no. 77, p. 1-3.

Availability of food, access to food, quality and nutritional value of food, and stability in the provision of food are the four pillars of food security. This article explores key issues affecting the ability to reach food security.
■ *Request No. 13606*

Motis, Tim.
"Introducing a New Crop: Reasons Why Seeds Fail."
ECHO Development Notes.
July 2009. Issue 104, p. 6-7.
Using information from the seed harvest report, this article examines the various reasons a seed may fail. Select this article to learn more about the contributing factors of seed success and failure.
■ *Request No. 13607*

Munguia, Osvaldo.
"Migration and the Environment."
Footsteps, Tearfund.
March 2009. no. 78, p. 10-11.

This article explores the link between migration and degradation of the natural environment in the northeast Honduran region of La Mosquitia. Select this article to learn more about migration causes and the ensuing effect on the ecosystem.
■ *Request No. 13608*

Mabbett, T.
"Better Housing for Happy Hens."
African Farming.
July/August 2009. p. 8-10.

Learn to design a poultry production system that meets the basic bird requirements. Select this article to learn about basic poultry housing, whether for laying, meat or breeding bird production.
■ *Request No. 13609*

Anguelovski, Isabelle.
"Building the Resilience of Vulnerable Communities in Quito."
Urban Agriculture.
June 2009. no. 22, p. 25–26.

Interviews from the municipality of Quito discuss adapting local food systems to climate change. Select this article for information on adapting existing local food systems to the impacts of climate change and strengthening relevant policies and programs.
■ *Request No. 13610*

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- ☐ 13603 "Rift Valley Fever Threatens Kenya."
- ☐ 13604 "Modern Hives or Modern Ideas."
- ☐ 13605 "Changing Farming Production in Africa to Adapt to Climate Change."
- ☐ 13606 "Improving Food Security."
- ☐ 13607 "Introducing a New Crop: Reasons Why Seeds Fail."
- ☐ 13608 "Migration and the Environment."
- ☐ 13609 "Better Housing for Happy Hens."
- ☐ 13610 "Building the Resilience of Vulnerable Communities in Quito."

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