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## ICIPE's 4h Paradigm: Approaches to Environmental, Plant, Animal and Human Health Research in Tropical Africa

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### Abstract

Many of Africa's problems are associated with a lack of energy for growth and development. Arthropods (insects, ticks and mites, spiders and others) - the most diverse and abundant forms of life on earth - are therefore recognised as a major contributor to the continent's lack of sustainable growth because of their ability to severely reduce the output of humans, animals and plants.

The International Centre of Insect Physiology and Ecology (ICIPE — [www.icipe.org](http://www.icipe.org)), was established in 1970 in direct response to the need for alternative and environmentally friendly pest and vector management strategies. Based in Nairobi, Kenya, ICIPE is mandated to conduct research and develop methods that are effective, selective, non-polluting, non-resistance inducing, and which are affordable to resource-limited rural and urban communities. ICIPE's mandate extends to the conservation and utilisation of the rich beneficial arthropod resources found in Africa and the tropics in general.

ICIPE focuses on sustainable development, to include human health as the basis for development and the environment as the basis for sustainability. Working in a holistic and integrated approach through the 4-Hs paradigm — Human, Animal, Plant and Environmental Health — ICIPE aims at improving the overall health of communities in tropical Africa by addressing the interlinked problems of poverty, low agricultural productivity, poor health and degradation of the environment.

ICIPE recognises that an increase in productivity cannot occur without a healthy workforce because sick people cannot be active in economic development. The Centre's Human Health Division (HDD) therefore focuses on improving the health of people so that they can be more active in the economy. The HDD is at the forefront of the control of one of Africa's most costly diseases — malaria. ICIPE is contributing to an integrated vector management approach (IVM) for malaria-carrying mosquitos by developing environmentally friendly tools and strategies to control the vectors at all life-stages, including the use of botanicals like Neem and bio-pesticides like Bt, to break the cycle of transmission.

New and novel approaches for controlling the riverine tsetse group, vectors of human sleeping sickness, an important re-emerging disease in tropical Africa, which has been recognised by the WHO as a Global Challenge, are also being developed to improve human health.

Similarly, livestock diseases continue to hold back development in large parts of Africa. In addition to being the source of milk and meat for pastoralists, animals provide farmers with draft power, hides and social status and wealth. ICIPE supports this prime role of animals by developing and promoting appropriate technologies for the sustainable management

of tsetse and tick disease vectors within sustainable farming systems in order to improve animal health and productivity.

ICIPE is contributing to improved sustainable food security and environmental health through the development of integrated pest management systems (IPM) in agricultural and horticultural crops, like biological control, use of behaviour modification, cultural methods and arthropod-active botanicals, with an emphasis on control approaches with no detrimental impact on the environment.

Environmental sustainability, a prerequisite to social and economic development, is a concept that ICIPE has wholly embraced since its founding 35 years ago. One of the Centre's main arenas of operation is developing integrated management methods that eschew the use of pesticides and maintain biodiversity.

In tropical Africa, the main roadblock to environmental conservation is poverty. Farmers too poor to rejuvenate the soil with nutrients or allow a fallow period, and forced to over-harvest forests and natural vegetation for income, are over-stretching demands on the environment and consequently disrupt nature's regenerative potential. Removing people's reliance on the forest by engaging them in commercially viable projects, such as sericulture and apiculture and cultivation of medicinal plants, is one of ICIPE's latest ventures.

As the only international institute working primarily on arthropods, ICIPE recognises its advantage in addressing the complex cross-cutting challenges affecting the continent. It further realises that the development of tropical Africa cannot be achieved without the advances in technology, such as the ones listed above, being adopted by the target communities. ICIPE's Centre-wide goals, therefore, include capacity building of individual researchers and institutions in the tropics; empowering women and harnessing the youth and building capacity to use, transfer and teach its technologies. In this way, ICIPE hopes to continue to work 'in Africa, for Africa' — the continent with the greatest needs.