USING TRADITIONAL METHODS AND INDIGENOUS TECHNOLOGIES FOR COPING WITH CLIMATE VARIABILITY

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Abstract. In agrometeorology and management of meteorology related natural resources, many traditional methods and indigenous technologies are still in use or being revived for managing low external inputs sustainable agriculture (LEISA) under conditions of climate variability. This paper starts with the introduction of an "end-to-end" climate information build up and transfer system in agrometeorology, in which the use of such methods and technologies must be seen to operate. It then reviews the options that LEISA farmers have in risk management of agrometeorological and agroclimatological calamities. This is based on the role that the pertinent meteorological/climatological parameters and phenomena play as limiting factors in agricultural production and the expectations on their variability. Subsequently, local case studies are given as examples of preparedness strategies to cope with i). variable water/moisture flows, including mechanical impacts of rain and/or hail, ii). variable temperature and heat flows, including fires, and iii). fitting cropping periods to the varying seasons, everywhere including related phenomena as appropriate. The paper ends with a series of important additional considerations without which the indicated strategies cannot be successful on a larger scale and in the long run.

1. Introduction

In a recent review of agrometeorology in tropical Africa, Olufayo et al. (1998) stated that consequences of climate variability show themselves at any time as the effects of the accumulated weather in the current growing season compared to those of the same period in previous years. There are countless farming communities which managed to survive and, in some cases, even to thrive by exploiting natural resource bases, which their forebears have used for generations (Reijntjes et al., 1992). Through a process of innovation and adaptation, traditional farmers have developed numerous different indigenous farming systems finely tuned to many aspects of their environment (LEISA, 2000). Such risk management strategies were in response to, among others, the limiting conditions of varying climate. Over the microclimate they nevertheless exercised significant control, as numerous review publications have indicated (e.g. Smith, 1972; Wilken, 1972; Bunting, 1975; Stigter, 1988, 1994; Stigter et al., 1992). However, new operational services in agricultural meteorology are badly needed for decision making in risk management for

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specific on-farm conditions. These agricultural environments of peasants in non-industrialized regions are now endangered by new and expanding hazards that rapidly change the living conditions in many places in the tropics and sub-tropics (e.g. Stigter and Baldy, 1993; Baldy and Stigter, 1997; Blench and Marriage, 1998).

Among much other literature, the IPCC reports, from many sources that they used, have convincingly reviewed the scenarios. Increasing climate variability, resulting in more frequent and more serious extreme meteorological and climatological events, will be a factor with which all farming systems will have to cope. Salinger (2004) has unmistakably concluded that we are heading for hard times in agriculture and forestry. From Africa (e.g. Mungai and Stigter, 1993; Stigter, 1995; Baldy and Stigter, 1997) to Latin America (e.g. Wilken, 1987) and different parts of Asia (e.g. Anonymous, 2001; Luo, 2001; Manton, 2001), those working in rural areas have become convinced of two essential issues. Firstly, traditional knowledge, indigenous practices and identified local innovations (e.g. LEISA, 2000, 2001) contain valuable information that should be used as a basis for improved farming systems practices to cope with the necessary changes in risk management. Secondly, contemporary science and new methodologies and technologies should, also in agrometeorology, be guided by appropriate policies, that themselves need a scientific basis and a humane socio-economic basis. They should be locally applied to develop agrometeorological services to assist in the risk management transformations needed (e.g. Smith, 1972; ILEIA, 1995; Stigter, 1999; Salinger et al., 2000; Stigter et al., 2000). Figure 1 reviews this systematically.

In their classic treatise, Brokensha et al. (1980) refuse to define indigenous knowledge and point to the case studies collected to describe it. Fifteen years later Warren et al. (1995) call it "the local knowledge that is unique to a given culture or society" and contrast it with the international knowledge system, which is generated through the global network of universities and research institutes, that we have called contemporary knowledge in Figure 1. Our context of LEISA farmers, this way defines traditional knowledge and indigenous technologies, also when, as may be expected, components of that knowledge have found their way into higher input and even high-tech growing systems. Local innovations are knowledge and technologies empirically generated by the, in this case LEISA, cultures and societies from within their present farming systems (LEISA, 2000). In line with the stewardship advocated by Houghton (1997) and the highest resilience emphasized by LEISA (2001), to the role of science applies the paradigm change worded by Norse and Tschirley (2000): technological change should no longer be driven by science but by environmental objectives and social concerns, like farmer innovations, operating through the market where appropriate. It is these policy environments that should guide the knowledge pools towards operational agrometeorological services for farm management decisions (Stigter 2002a, 2002b).

This paper exemplifies the valuable local knowledge of preparedness strategies. It wants to work with case studies in which indigenously developed technologies