

# Chapter 69

## Incremental Learning and Gradual Changes: “Science Field Shops” as an Educational Approach to Coping Better with Climate Change in Agriculture

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### ABSTRACT

*The environmental consequences of climate change in agriculture have been degrading farmers' livelihood and welfare because of their inability to cope with the unusual risks and livelihood crises due to climate change. However, state policies addressing farmers' needs to develop their coping mechanism towards the unusual consequences of climate change have not been defined appropriately. To continue relying on their conventional ways of farming would not effectively help them to survive in the midst of unusual weather conditions. A long-term educational commitment to improve farmers' agrometeorological learning is urgent. The authors present their inter- and trans-disciplinary collaborative works in providing climate services to farmers through Science Field Shops. Improving farmers' anticipation capability has been carried out through various means of learning. The authors describe the incremental learning process and the gradual changes the farmers in Indramayu Regency have gone through since 2010.*

### INTRODUCTION

Various parties in Indonesia have great concerns regarding the environmental consequences of climate change, notably including the agricultural environment. These worries, however, extend to people's degrading livelihood and welfare as a whole because of their inability to cope with the unusual risks and livelihood crises due to climate change (e.g., Fox, 2014; Stigter, 2011a; Stigter, 2014; Winarto & Stigter,

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2011). It has also been found that some local knowledge systems to predict weather and climate patterns were becoming unreliable, and that traditional emergency preparedness systems need to be adapted to accommodate the unprecedented contemporary climate change (Crate, 2011; Zuma-Netshiukhwi, Stigter, & Walker, 2013). The challenge is how to assist local people appropriately in such increasing variability and vulnerabilities. This article examines a collaborative effort between scientists and farmers to find a more appropriate approach to assist farmers to cope better with climate change, increasing their climate resilience (Winarto & Stigter, 2011). The authors argue that bringing new knowledge to farmers, to increase their understanding of the ongoing changes of climate and their consequences for their own habitat, must address the ways farmers learn incrementally. Shifting their conventional farming strategies gradually into more adaptive ones of responding to uncommon changes needs an ongoing dialogic knowledge exchange between farmers and scientists and among farmers themselves (Stigter & Winarto, 2012a). This should include extension intermediaries where they got thoroughly trained on climate change and other environmental issues (Stigter & Winarto, 2013b). Farmers are the active observers and learners (see Winarto & Stigter, 2013a, 2013b). The authors' collaborative efforts in developing farmers' agrometeorological learning through "Science Field Shops" (SFSs) reveals their incremental learning and the gradual changes of their mind and their practices in response to climate change.

## **BACKGROUND**

### **Recent History**

Starting with 2009-2011 growing seasons and till the most recent ones of 2013-2014, the authors observed that farmers in Java experienced hardship in cultivating rice due to significant yield reductions or even harvest failures. Main causes have to do with severe outbreaks of brown plant hopper (BPH), worsened by above average rains (Stigter, 2012), in addition to more common pests such as rats, rice stem borers, and some diseases. Consequently, there was a decrease in rice production in Indonesia in 2011, and again in 2014 (Departemen Proteksi Tanaman, 2014; Fox, 2014).

*We used to have some rains in October to begin preparing our fields. Why there have been no rains at all up to November inclusive? Usually, after the first rains, we have some dry period, 'small dry season', but now, there are continuous rains without any dry days... The rainy season starts late, but why all of a sudden there are continuous high intense rainfalls? Not often in my life have we experienced severe floods like this, covering all fields in my area.*

Those are some observations and questions farmers raised throughout the ongoing rainy season of 2013/2014. Early 2014, farmers on the north coast of Java suffered from floods following high rainfalls. The severe floods in January 2014 were aggravated due to damages of dikes and water gates that could not withstand the high volume of water run-off from higher elevation to the seashore of West Java. These floods were beyond expectations (see *Kompas*, 2014a; Santosa, 2014). Farmers had to re-sow their nurseries several times leading to delays of harvesting with various pests infesting their rice fields. In contrast, farmers north of the equator in South Sumatera province suffered from drought in January-February 2014 which also caused a delay in their planting season till March 2014 (*Kompas*, 2014b). Lack of water resources was also a problem in the dry season of 2014.

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