

OKI TAIKAN LAB.

[Big Data in Hydrology]

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Global Hydrological System

Our laboratory has been developing global hydrologic simulation models that account for human activities to increase our capabilities to assess the impacts of climate and social changes on water cycles, to estimate the balance between water supply and demand, and to forecast floods and droughts. We are also incorporating recent achievements in other research fields such as human well-being and behavioral economics, with the belief that our efforts to understand and manage water-related global risks should improve human well-being and increase happiness of all mankind.

Changes of Virtual Water Imports to Japan within the Recent Decade

The Virtual water (VW) trade was originally a metric illustrating how food import potentially alleviates water shortage in the importing states and regions by reducing water demand for food production. However, it is now/also widely used to indicate exogenous water resources.

Japan mostly imports VW from water rich countries.

VW imported to Japan has not directly caused water shortage in developing countries.

The total change is not substantial but VW imported from water scarce countries has decreased and VW imported from water rich countries has increased from 2000 to 2010.

Transition of VW origins could have potentially alleviated water shortage in the world.

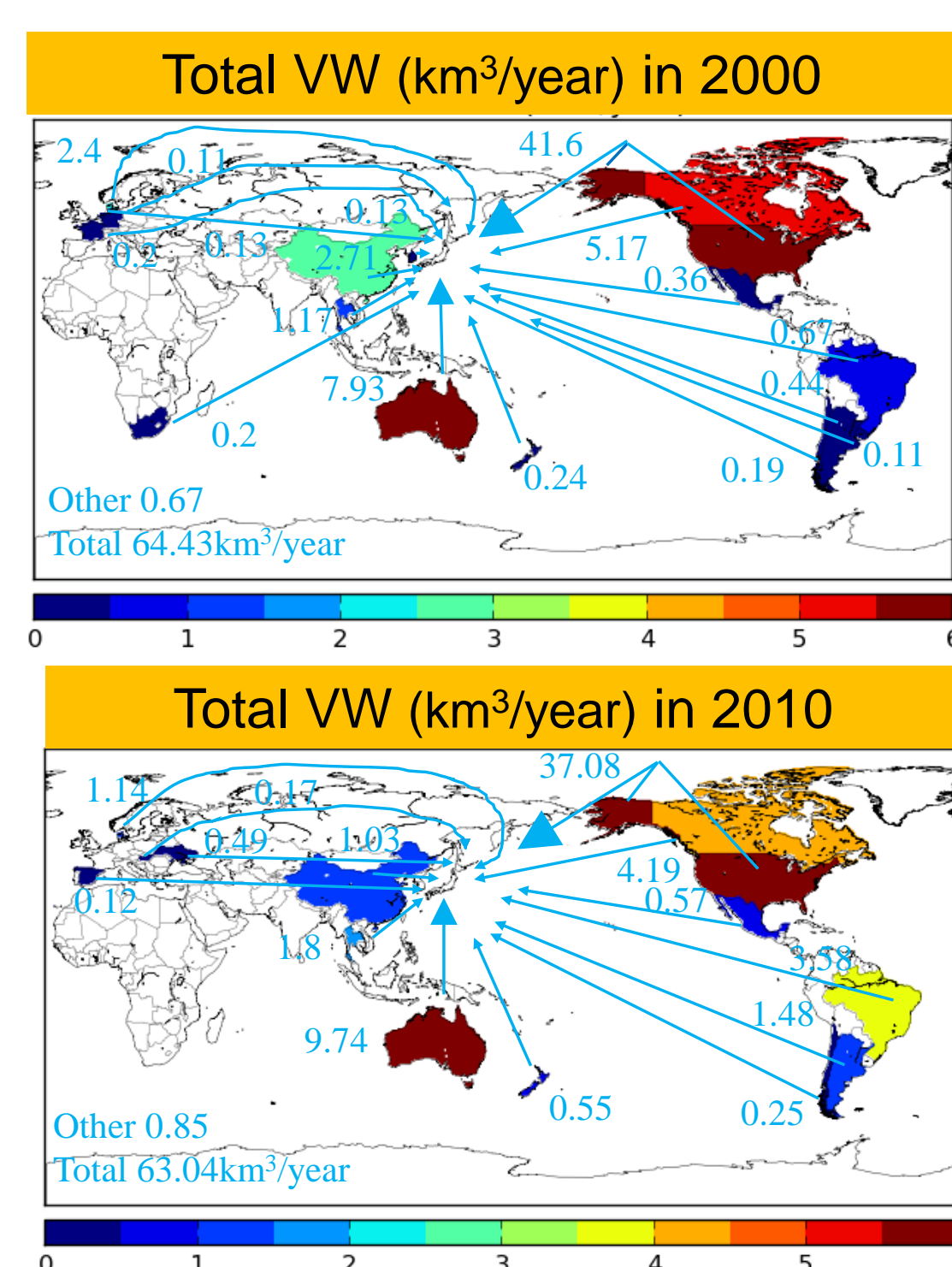


Fig.1 Total VW import to Japan (in 2000 and 2010)

Model for Assessing the Vulnerability to Famine

Elimination of famine remains to be solved even in the contemporary world of food surplus. In this study, a method assessing the vulnerability to famine in each country was developed. It consists of two layers: food supply potential (production stability and import power) and the distribution within a country (urban population ratio). The finding that urban pop. ratio is the most influential factor suggests that enhancing efficiency of food distribution is the key to overcome a famine.

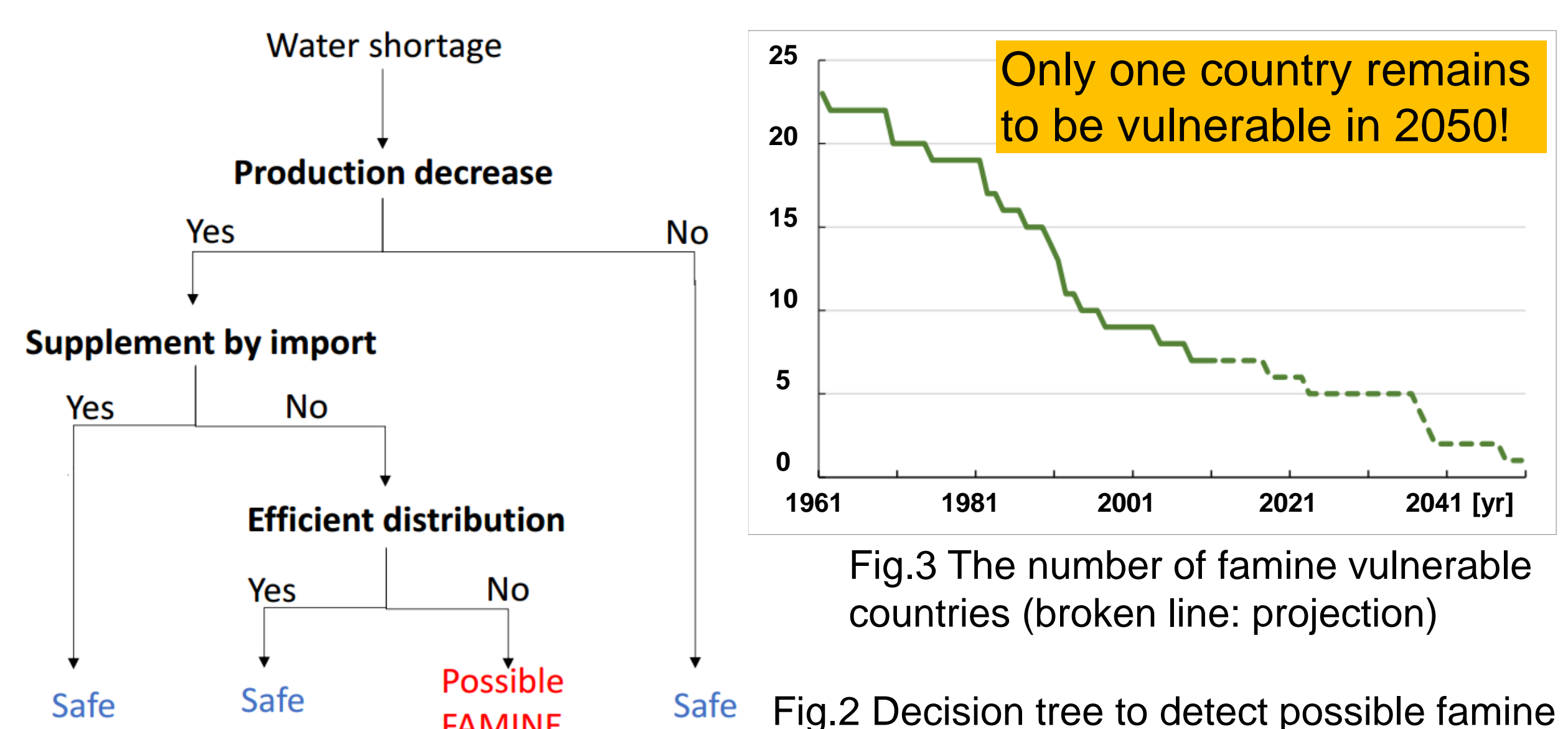


Fig.3 The number of famine vulnerable countries (broken line: projection)

Fig.2 Decision tree to detect possible famine

Impacts of Achieving the MDGs on the Increments in Subjective Well-Beings

The UN Millennium Development Goals (MDGs) include eight goals aimed at reducing poverty. However, there are currently regional disparities, and post-2015 goals reflecting subjective values are required. Recently, Subjective Well-Being (SWB) has attracted attention as the alternative measure of utility. We analyzed how much the progress in each MDGs-target affects SWB scores in developing countries and searched for the effective way of setting new goals to enhance the SWB level.

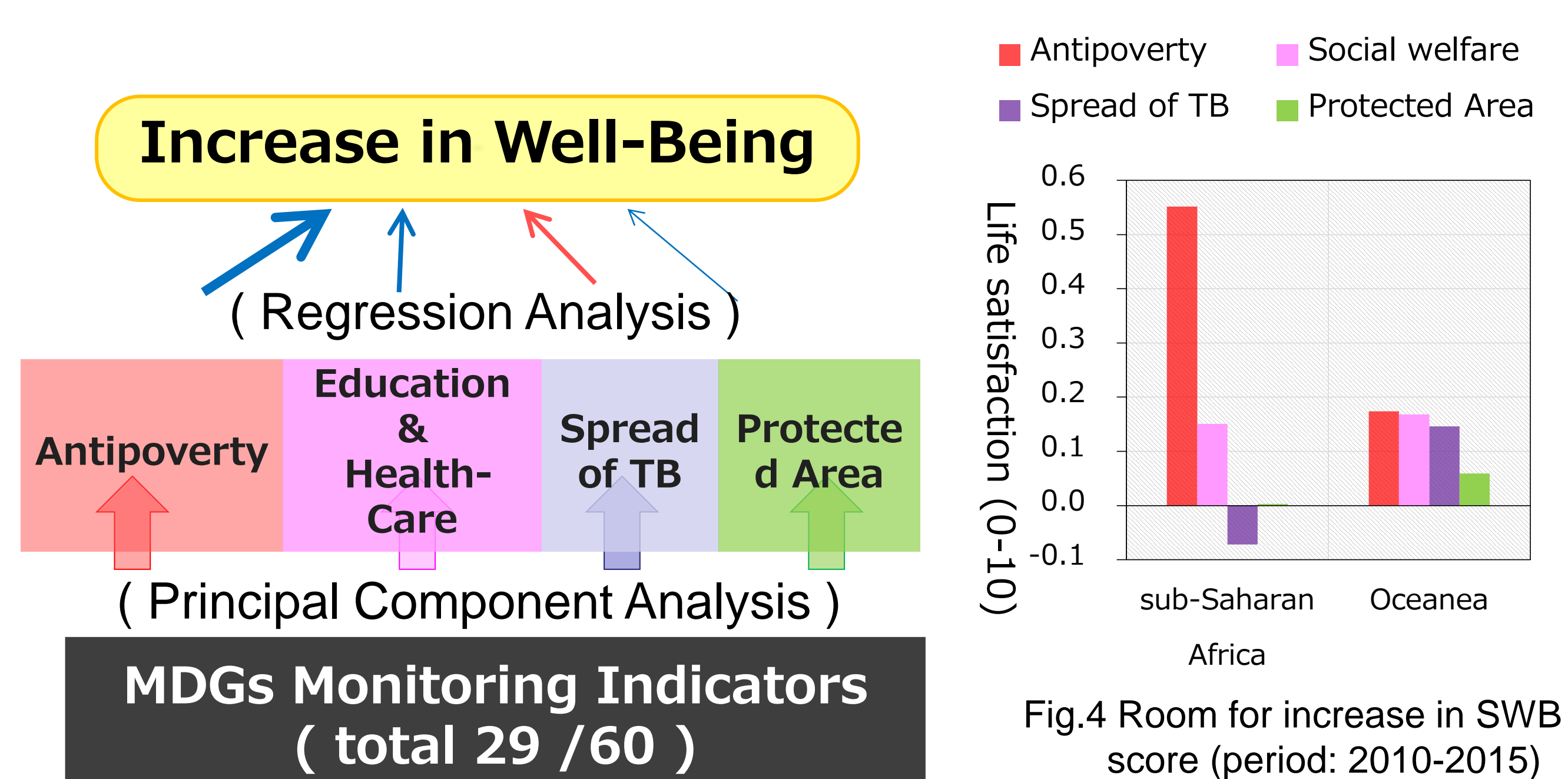


Fig.4 Room for increase in SWB score (period: 2010-2015)