

Aakash Project

RIHN Full Research (April 2020 - March 2025)

This study addresses air pollution caused by large-scale post-harvest burning of rice straw in October and November in the states of Punjab and Haryana in northwestern India. Burning results in severe air pollution in surrounding areas, affecting public health and the well-being of hundreds of millions of people. This project will utilize observation data and model simulations to scientifically examine the connection between stubble burning in Punjab and severe air pollution in Delhi. Based on the findings, and considering the cultural background and local awareness of the negative impact of air pollution on health, we hope to encourage social transformation aimed at cleaner air, improved public health, and sustainable agriculture.

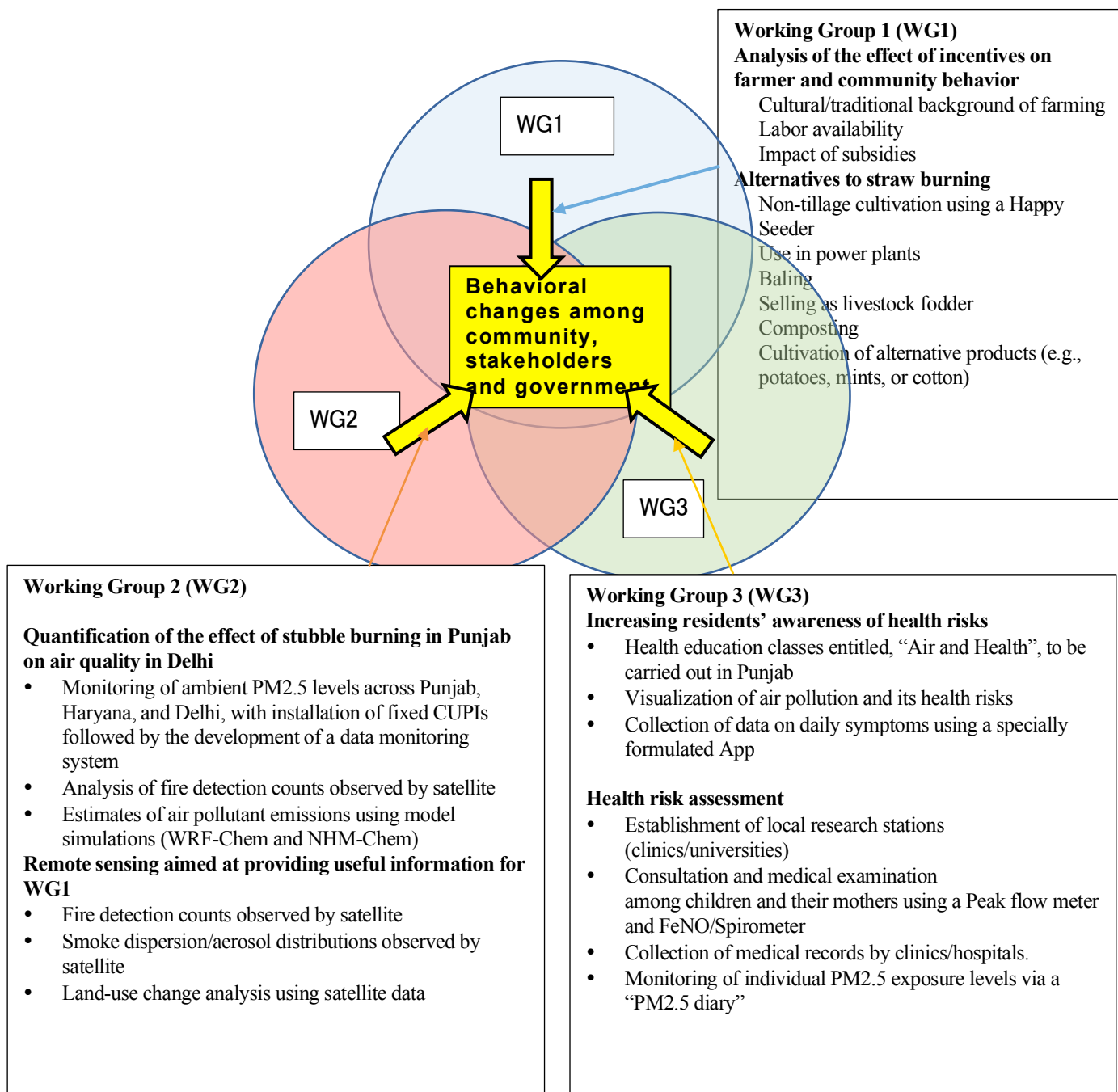
Our Goal

The aim of this project is to encourage social changes aimed at realizing cleaner air, improved public health, and sustainable agriculture. We will investigate behavioral changes within the community and among stakeholders and government bodies in response to various measures such as economic incentives, technological advances, and increased awareness of health risks. **Figure 1** shows the structure of the three working groups involved in the project.

The results of this study will allow policy makers to make informed decisions about programs designed to increase awareness and disseminate information with an emphasis on the environment, as well as livelihood protection and economic development. Accordingly, the findings will serve as a basis for addressing similar air pollution issues on a regional and global scale.

Project structure

Figure 1 Structure of the three working groups



Research Plan

WG1

WG1 will examine the effect of incentives aimed at ending stubble burning among farmers, while highlighting various alternative uses for straw. A questionnaire survey will be conducted in conjunction with WG2 and WG3 in FY2020. The survey will examine the following.

- Economic status
- Status of stubble burning (continuing or stopped), and reasons for doing so
- Cultural/traditional background of farming in the region
- Labor availability
- Use or non-use of subsidies provided for purchase of a Happy Seeder or other machinery, and reasons for doing so
- Treatment experiences in medical institutions
- Interest in one's own health

From the latter-half of FY2020, the results of the questionnaire will be analyzed to provide an understanding of farmer behaviors.

In collaboration with LPU, PAU, CIPT, and IRRI-India, WG1 will also examine various alternatives to burning straw.

- Cultivation of other products (e.g., potatoes, mints or cotton)
- Selling as livestock fodder
- Composting
- Baling

WG2

The initial goal of WG2 is to quantify the effect of stubble burning in Punjab on air quality in Delhi. Quantification will be carried out as follows.

- Monitoring of ambient PM_{2.5} levels across Punjab, Haryana, and Delhi, with installation of dozens of fixed Compact and useful instruments (CUIs) to develop a data monitoring network
- Analysis of fire detection counts observed by satellite
- Estimations of air pollutant emissions using model simulations (WRF-Chem and NHM-Chem)

The remote sensing team will provide useful information for use by WG1 as follows.

- Fire detection counts observed by satellite
- Smoke dispersion/aerosol distributions observed by satellite
- Analysis of land-use changes by using satellite data
- Geographical distributions of double-cropping fields, including information on cultivation periods

WG3

In collaboration with various local institutions, WG3 will conduct health education classes entitled “Air and Health” in rural villages in Moga and Ludhiana districts, Punjab with the aim to increase health awareness.

WG3 doctors, assisted by local collaborators, will perform medical examinations of children and their mothers and use a peak flow meter to test their pulmonary function. A smartphone application available in each local dialect will be used to collect information on the daily symptoms of residents.

*The research plan may need to be modified in line with COVID-19 restrictions. A revised version is therefore under preparation as of Sept. 2020.