

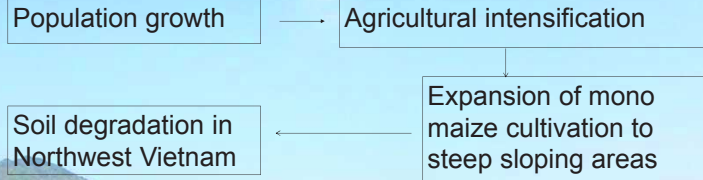
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## Introduction



Objective

Evaluate the spatial development of soil fertility under mono-maize cultivation

Specific objectives

- (1) Determine dynamics of total Nitrogen (N<sub>tot</sub>) and total Carbon (C<sub>tot</sub>)
- (2) Develop the spatially - explicit Dynamic of C<sub>tot</sub> and N<sub>tot</sub> distribution model (DyCNDIs) to assess potential impact of land use change on C<sub>tot</sub> and N<sub>tot</sub> dynamic

## Material and Methods

### (1) Study site

Chieng Khoi commune, Yen Chau province, Northwest Vietnam

- Size: 3,100 ha
- Population: 2999 (in 2011)

### Climate

- Temperature 24°C
- Rainfall: 1250 mm

### (2) Material and Methods

#### (a) Transect sampling:

- Auger soil sampling every 5 m topsoil of 3 transects, 25-30 m length in slope gradient. Lab analyses C<sub>tot</sub> and N<sub>tot</sub> by combustion method
- Crop history obtained by interviews in the field

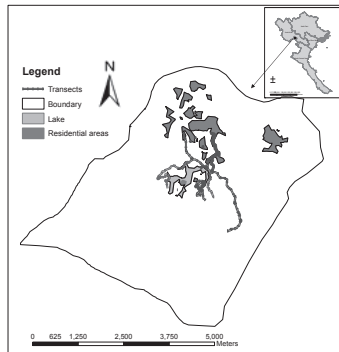


Fig. 1 Study site

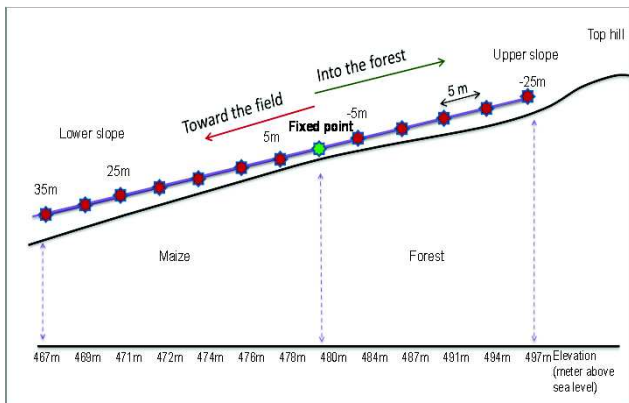


Fig. 2 Transect sampling design

(b) Secondary data collection: Derived from previous studies in the same study region

### (c) Model concept

- DyCNDIs concept based on component processes (Fig.3)
- Hotspot threshold was defined through farmers' indicators
- Validate model: modeling efficiency (EF) and root mean square error (RMSE)

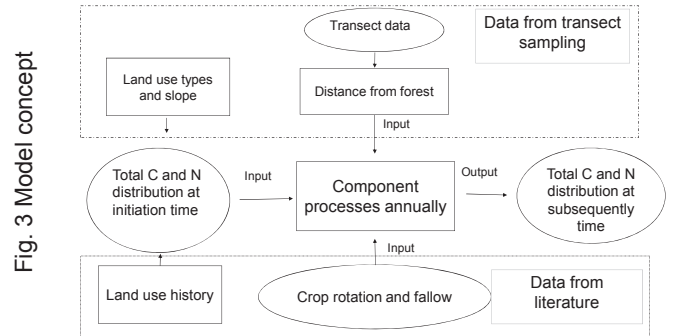
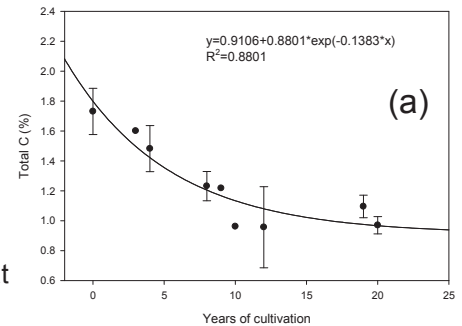


Fig. 3 Model concept

## Results

(1) Reduction of C<sub>tot</sub> and N<sub>tot</sub> along the slope gradient related with time of cultivation



(2) DyNCDIs model identified 134 ha (19% of the total 708 ha) that show a high potential of soil degradation after 20 years of continuous maize mono-cultivation in Chieng Khoi commune

(3) Model validation showed satisfying EF in the range of 0.71 and a RMSE of 0.42

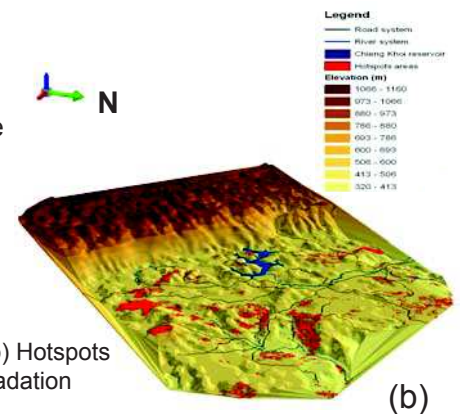


Fig. 4 (a) Correlation (b) Hotspots distribution of soil degradation

## Discussion and Conclusions

DyCNDIs model was developed successfully to assess the dynamics of changes of C<sub>tot</sub> and N<sub>tot</sub> concentrations at watershed level

Providing assessment tools such as DyCNDIs supports land use planners and farmers to identify locations which are susceptible to soil degradation that need urgently soil conservation measures to retain soil fertility in the long run