# NERC/DFID/ESRC project

# ESPA-Climate: *Using climate change information in ecosystems services for poverty alleviation research in China*

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# ESPA Climate - Background

- Climate change is a key driver of change in ecosystems, ecosystems services and their links with the causes and alleviation of poverty.
- However, many research groups do not have the skills and tools to use climate change information (in current climates and future climates – from the coming season to many decades ahead) in ESPA research.
- Through a structured programme of knowledge exchange, this project is addressing the skills needs of two major stakeholder groups in China – potential ESPA researcher in Universities and research institutes and poor communities living in ecosystems vulnerable to climate change.

# ESPA Climate - partners

- Walker Institute for Climate System Research, University of Reading
- Chinese Academy of Agricultural Sciences
- Chinese Academy of Sciences
- CAB International
- Met Office Hadley Centre
- University of Leeds

Case study partners

- University of Inner Mongolia
- Ministry of Water Resources, Gansu

# ESPA Climate - activities

Activity 1 **Building Capacity**

- Survey of training needs

- Four two-day workshops.

  1 & 2 – An introduction to climate change and its impacts on ecosystems in China

  3 & 4 – Using climate model output in ESPA research

# ESPA Workshop 3, Nanjing, 12-13 Nov 2009

# ESPA Workshop 4, Beijing, 16-17 Nov 2009

- The workshops provided an overview of some recent climate changes in China and the causes of these
- The issue of uncertainty and how this arises was explored and the implications for regional climate scenarios and their application for assessing impacts was demonstrated
- The PRECIS regional climate modelling system was introduced
- A practical session was held in which tools to process and display PRECIS data were introduced and used on output from a PRECIS climate change experiment
- Methods for validating and calibrating RCM output were demonstrated on a PRECIS simulation of the recent past

# ESPA Workshop 3, Nanjing, 12-13 Nov 2009

# ESPA Workshop 4, Beijing, 16-17 Nov 2009

- Some regional climate scenarios for China developed using PRECIS were presented along with an overview was provided of the ACCC project which aims to provide and apply a wider range of climate scenarios
- A description was given of the principles of crop modelling and developing models relevant for studying climate change impacts
- A practical session was held in which the crop model GLAM was run using output from PRECIS to demonstrate use of regional climate scenario data for studying climate change impacts relevant to ecosystem services and adaptation

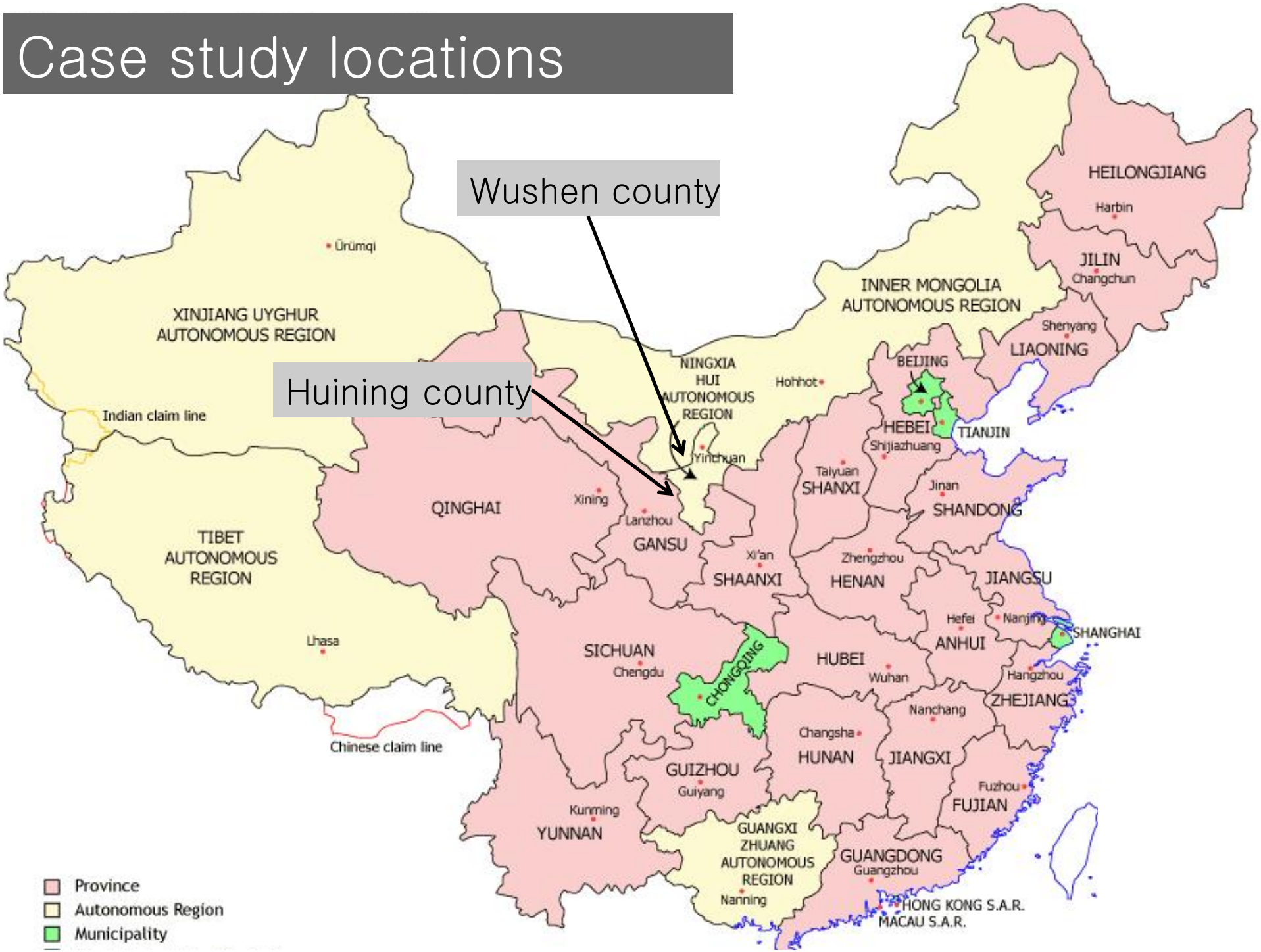
# ESPA Climate – activities

Activity 2 **Raising Awareness**

- Two case studies
  - Inner Mongolian Autonomous Region grassland ecosystem
  - Gansu Province agricultural ecosystems

- Aim to raise awareness of climate change issues and explore how climate change issues can be better communicated between different stakeholders within the ESPA programme

# Case study locations



# Case studies

Two case studies contributed to project output 2: *'improved communication between potential ESPA researchers and poor communities of climate issues and how these impact on local ecosystems'*

Teams of scientists in Inner Mongolia and Gansu researched local perceptions of ecosystem and land use change, and interactions with climate, using:

- survey questionnaire
- participatory methods
  - timelines
  - cause-effect diagrams
  - communication maps

Researcher interviewing farmer in Sasha Tan village, Inner Mongolia

Farmers constructing cause-effect diagram in Huining County, Gansu

# Survey questionnaire

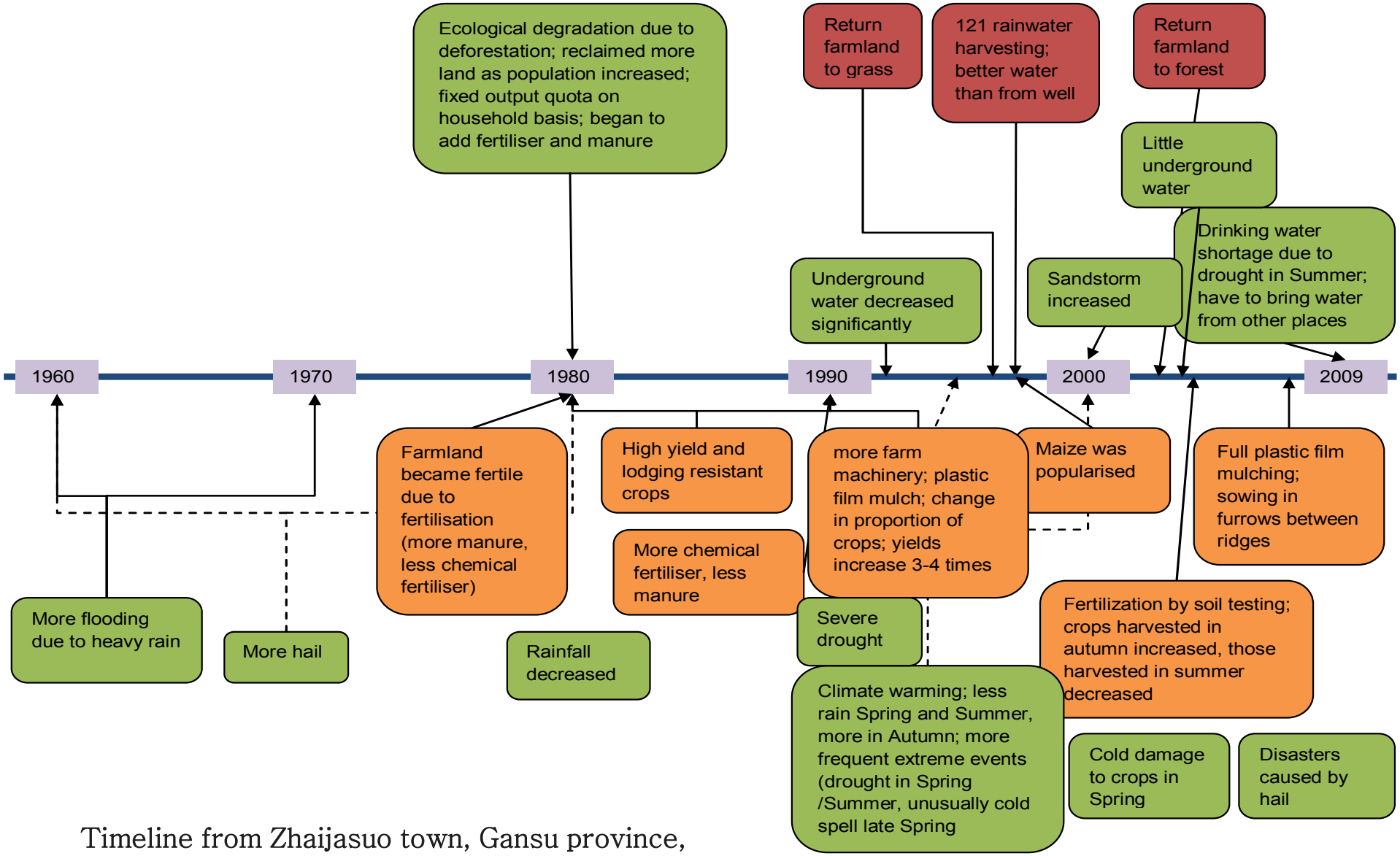
- changes in income from farming
- changes in farming practices
- awareness of climate change
- changes in farming in response to climate change
- mixture of closed and open questions
- 100 respondents (non-random) in each case study

# Participatory methods

- acknowledge different ways of interpreting and knowing
  - what science measures and records
  - what people see and recall
  - social construction of knowledge
- co-production of knowledge
  - within group of participants
  - between participants and researchers
- space for communication between participants and researchers
- visualisation of outputs facilitates communication and validation by participants

# Timelines

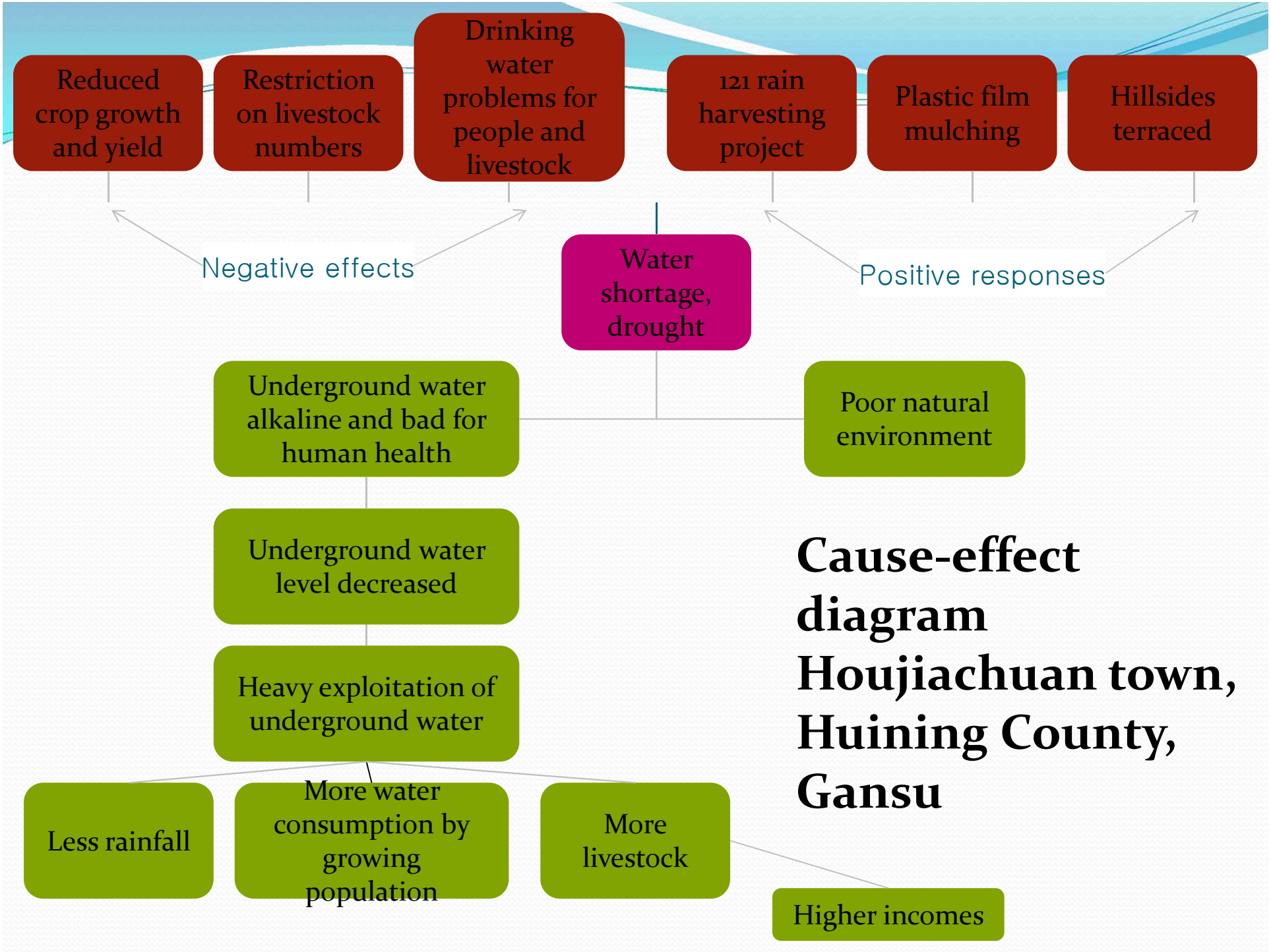
- ‘what changes have happened in farming, land use and the physical environment in this area?’
- for each environmental change:
  - what caused it?
  - what effect has it had?
- for each farming and land use change:
  - where did the idea come from?
  - why did the change happen?
  - what effect has it had?
- draw events on a horizontal line on sheet of paper
- analyse patterns across different timelines




Timeline from Zhaijasuo town, Gansu province, China

# Cause – effect diagrams

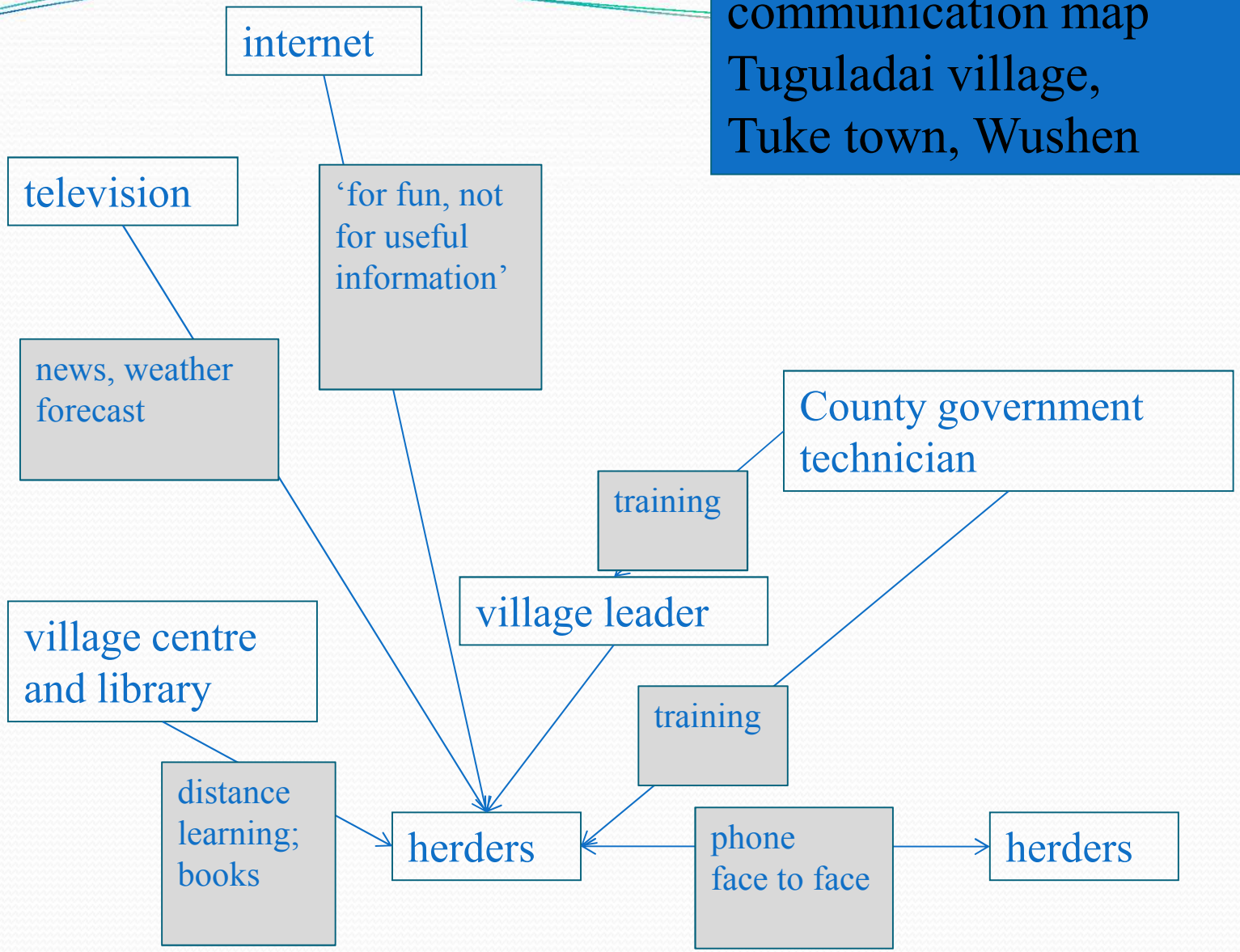
- identify a significant issue or problem
- brainstorm causes of the problem
- arrange causes in logical, hierarchical structure
- brainstorm effects of the problem
- arrange effects in logical, hierarchical structure
- discuss what can be done to address the causes of the problem


Reduced crop growth and yield
Restriction on livestock numbers
Drinking water problems for people and livestock
121 rain harvesting project
Plastic film mulching
Hillsides terraced
Negative effects
Water shortage, drought
Positive responses
Underground water alkaline and bad for human health
Poor natural environment
Underground water level decreased
Heavy exploitation of underground water
Less rainfall
More water consumption by growing population
More livestock
Higher incomes
Cause-effect diagram Houjiachuan town, Huining County, Gansu

# Communication maps

- identify sources of information and advice
- arrange these in three levels:
  - local
  - county
  - province, national and international
- assess each on a set of criteria, e.g.
  - frequency of contact
  - ease of contact
  - reliability of advice and information
  - usefulness

# communication map Tuguladai village, Tuke town, Wushen



# Themes from the timelines

**Huining County, Gansu (five timelines)**

- Weather pattern changes
- Environmental deterioration (soil erosion, loss of species)
- Return of species in response to human action
- Government projects and policies to mitigate & adapt
- Farming system changes
- Livelihood changes

**Wushen Country, Inner Mongolia (five timelines)**

- Decrease in precipitation
- Grassland deterioration
- Falling incomes from arable farming
- Private and public tree planting initiatives to combat desertification
- Policy changes (e.g. distribution of land to families)

# Findings

- changes in weather patterns noted  by farmers and herders
- ‘global climate change’ not a common perception, in spite of exposure to television
- government (county, province, national) is important influence on local capacity to adapt
- effects of human activity on ecosystems is understood
- local concerns focus on income, livelihoods and quality of life
- general optimism for the future

# Scientists' reactions

- Scientists were staff and graduate students from
  - Department of Ecological Science, Inner Mongolia University, Hohhot
  - Institute of Arid Meteorology, Lanzhou, Gansu Province
- Participatory tools were useful to gain insight into what farmers know and think
- Farmers' detailed knowledge about system changes and underlying processes was unexpected
- Scientists gave useful suggestions for improving the tools, which they felt they could integrate into their future research
- Farmers gave useful information on social and economic aspects of ecosystem change, complementing the biophysical understanding from the scientists' own research
- Participatory research is a useful medium for communication among stakeholders, as well as a method for information gathering and analysis

# ESPA Climate – China activities

Activity 3 **Communication**

- to a range of stakeholders
- different media – print, film, web-based
- ESPA Climate Network www.espachina.org/climate
- agenda-setting document: final recommendations to ESPA research programme

# Outcomes of ESPA Climate

- Delivery of capacity-building workshops
- Establishment of ESPA Climate Network
- Case study reports
- Recommendations to the ESPA research programme
- Video documentaries/TV broadcasts

# Resources for future activities

ESPA Climate Network

- www.espachina.org/climate
- Workshop presentations, news, information, useful documents

PRECIS website and support

- precis.metoffice.com and precisrcm.com
- Information, example worksheets, analysis tools, sample data

ACCC and SAIN projects

- DFID and DEFRA-funded projects on developing and applying climate scenarios for risk-assessment and adaptation

Thanks