BUAS Bursary Award 2016
Patricia Stewart

A Study into the Effect of Climate Change on the Agricultural Communities of the Kullu Valley, India.

Update 2021

I was delighted to be the recipient of a BUAS Bursary Award in 2016 and my thanks again go to the BUAS for this wonderful opportunity. It has allowed me to develop teaching and learning resources that are topical and relevant to the agricultural community that we are part of, and has raised awareness in Kelso High School students of the wide variety of opportunities that are open to them in the agricultural sector.

The award enabled me a lifetime opportunity to travel to the Kullu Valley in Northern India to research the effect of declining bee populations on crop pollination and the resulting impact on farming practice and policy in the Kullu Valley, North India. My aim was to focus the expedition findings to link with LfS (Learning for Sustainability) work carried out at Kelso High School, as driven by the interests of staff and pupils, and relevant to the Scottish Borders agricultural community. Since my visit to India educational resources including course materials and resources have been developed as follows:

- **Outdoor Learning in Kelso High School Grounds**

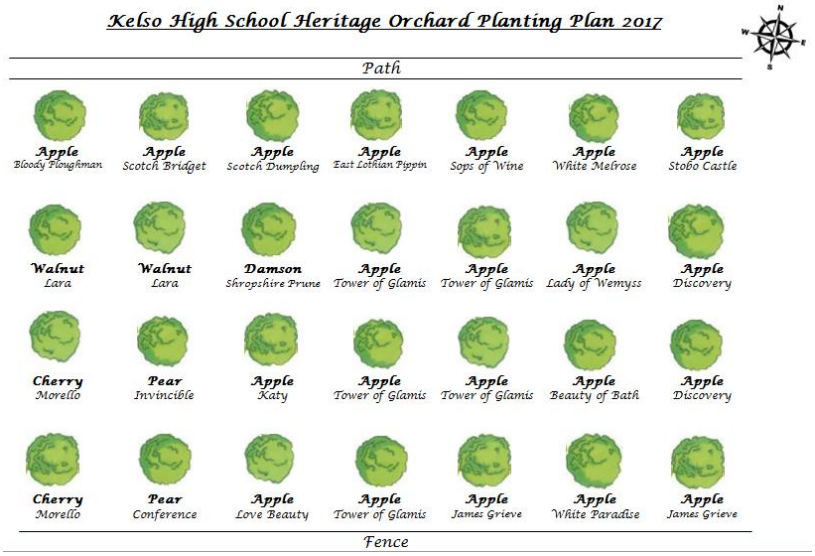
Our school community has moved into our new school campus with the surrounding grounds having been developed in such a way that we can replicate some of the studies that I experienced in the Kullu Valley orchards.

Wild flower areas have been established and lesson plans and investigations devised to allow staff to use these areas in a scientifically meaningful way. The aims of the suggested investigations are to:

- Enable students to identify honey bees and the most common species of bumblebee.
- Introduce students to methods for observing, recording and analysing bee behaviour in natural environments
- Enhance students' understanding of the process of conducting a scientific investigation
- Develop students' awareness of the environmental importance of bees in pollination and crop production
- Encourage students' appreciation of, and care for, the natural environment

Investigations are differentiated for age/stage/ability.

The Kelso High School Heritage Orchard was planted in 2017 with generous financial assistance from the Borders Tree Planting Grant Scheme and has been planted with some of traditional varieties that would have been seen in the locality in times gone by. Varieties planted include *James Grieve, White Melrose, Bloody Ploughman, Stobo Castle, Tower of Glamis, East Lothian Pippin,* and *Scotch Dumpling. The Heritage Orchard* aims to re-create a traditional orchard for the interest and benefit of the pupils, staff and wider community.



The orchard will take several years to mature but it is planned that in due course it can be used for a variety of scientific and other subject studies including:

- Phenology Study - Phenology is the study of the times of recurring natural phenomena, especially in relation to climate. The aim is to establish a Kelso High School phenology record focussing on the orchard and its pollinators.
- Pollinator Study – In conjunction with the Kelso High School apiary, pollinator studies could be carried out, including honeybee behaviour, life-cycles, etc.
- Variety Comparison – once the trees come into production varieties can be compared for taste, cooking features, etc.

- **Climate Change Awareness**

Lesson plans on the theme of climate change have been devised for the Environmental Science curriculi. These are based to a large extent on the agricultural industry with a comparison of the situation in the agriculture communities of the Kullu Valley to that of students' own experiences in the Tweed Valley. Activities allow students to explore specific opportunities and challenges that climate change brings to different agriculture sectors and how farmers can mitigate the effects of it. Students are given opportunities to 'lead the learning' transferring and applying their knowledge from other subjects and from their personal experiences. On completion of the activities students' perceptions of opportunities for careers in agriculture are challenged with suggestions and discussion on potential careers for the future in the agriculture sector. This series of lessons is now a regular feature in our teaching and the themes explored seem to becoming increasingly relevant to our agricultural community as the impact of climate change is ever more apparent.

- **National 5 Beekeeping**

Mr Ray Baxter, a colleague in the Science Department has led a hugely successful drive to raise the profile of bee-keeping at Kelso High School. Starting as an after school club it soon became popular with students and over the last six years the course has developed to become a nationally recognised SQA qualification. We were the first in Scotland to be approved to teach this qualification and interest continues to grow across Scotland, with more than 20 schools now involved. For many students, beekeeping creates lots of discussion in the home and parents often get involved. We now have three families keeping bees at home - a welcome distraction for many during lockdown!

It is a fabulous course, requiring courage, self-control, skill development and a scientific understanding about the biology of honey bees and how they interact in the environment. At Kelso High School, the course has a strong science focus and works to promote scientific study about honey bees, For example, in 2020, students worked with geneticists from Edinburgh University to research microorganisms that can harm honey bees. Our work was selected from all UK to show to Fellows of the Royal Society at their annual conference. The video that was showcased to fellows can be seen here Secondary projects | Royal Society.

We are currently researching the antimicrobial effects of different kinds of Scottish honey. We will be working with six Scottish schools and researchers from The Royal Dick veterinary college, looking at using honey for managing wounds in horses and donkeys. Currently, Manuka is the only honey type that can be prescribed to treat wounds and commands a huge price tag at £50K per tonne, so this research is hugely relevant for Scottish beekeeping.

The latest news is that we have a new school apiary in the gardens of Floors Castle, who have generously volunteered the school a learning space to study bees and pollinators. The pictures show our students carrying out the first assessed inspection at the castle.