

2008 Youth Agriculture Education Grant
Final Report
Kodiak High School 'Sustainable Greenhouse' Project

Please find enclosed the Deliverables that were agreed upon at the receipt of this grant.

Summary of the curriculum created, identifying the successes and challenges of it.

Building a Greenhouse
Steps for the process and success.

1. Develop Partnerships

Put the word out that your school or youth group is building a greenhouse. Get parents and community involved. You would be surprised at the number of parents who you don't see at school or in the classroom come out of the woodwork to help in an area they feel they have some expertise! In my case it was a parent who was a contractor and had always wanted to build an off the grid, year round greenhouse.

With regards to building materials (when you get to that part) contact local contractors that are in the middle of a project and ask if you can have unused material left over when their project is finished. 2 X4s, windows, nails, etc.

Also ask local contractors if they would be willing to donate heavy equipment and operator time and gravel. (Often donations like this can act as a tax write off for the contractor and you can also sweeten the deal by publicly thanking them in the local newspaper!)

Make friends with your local building supply store's manager and see if you can get your materials at cost. Check with your school district to see if there is already a similar arrangement in place. Sell the idea of the greenhouse and advertise how it will benefit the whole community!

2. Location

Before considering the design of a school program greenhouse, it should be determined where the green house will finally reside. (I say finally because ours was built at a different site that where it sits now.) Slope, access to electricity, possibility of expansion all need to be taken into account. I always thought it was easier to ask forgiveness than ask for permission. This is not true when working with a school district whose buildings sit on Borough land. Make sure you know the building codes of the site area before you get too far into your project. We had a site all picked out – superintendent approved, etc, then found out that we wouldn't be able to put a windmill up for generating power for the greenhouse. There was a code that stated that structures and attached paraphernalia could only be a certain height. Back to the drawing board to find a new spot. (Enter the facilities manager for the school district and borough assembly) It all turned out fine. The second choice location, although not quite as wind proficient as the first will accommodate the height of a windmill as well as solar panels. We have room on the greenhouse site for raised beds as well.

3. Greenhouse Design

Now that you know the 'lay of the land' with regards to where your greenhouse will reside, you can start thinking about design. Questions to answer:

Square footage of greenhouse?

Design that can be expanded?

Do you need a space for storage? (pots, potting soil, tools, etc)

Will you grow in pots and/or raised beds?

Do specific plants that you wish to grow have particular space needs?
(Example: hanging baskets with draping foliage)

Potting bench?

Drainage?

What type of foundation?

(note: we built our greenhouse in my classroom which is a large shop. Our design allowed the greenhouse to be built in sections so it could be taken apart and put back together on site.)

Once you finalize your design, at least in our case, the plans had to be OKed by a civil engineer in the Kodiak Building Department. Because of our design's resistance to lateral load and uplift (This means our design was TALL and there was concern that we have the proper foundation to hold it down on WINDY days.)

4. Materials List

At this point in the process you are ready to create a materials list. Our parent contractor was able to draw the plans for the greenhouse as well as create our materials list. Now would be the time to start looking around at construction sites for donations. We were fortunate that between grant monies, monies our FFA organization had earned as well as donations from community members – we were able to finish 80% of the project within 9 months for approximately \$6,000.00 (Not including windmill and solar panels)

5. Timeline for the Actual Construction

We sat down with our FFA chapter and asked the members how much time they were willing to put into the greenhouse building project. They decided that they would be willing to work two days a week afterschool, 3:30 – 5:30. As with most projects, there is great enthusiasm at the beginning and as the 'real work' starts, enthusiasm starts to wane. We had a core group of 5 kids that did 70% of the work, which actually worked out as a benefit. Keeping more than 5 kids busy for two hours would have been difficult at times. Groups of kids came in handy when we painted and raised walls as well as dug the pad for the foundation.

I figured that we averaged 12 hours of real work time a month (figuring in holidays, ect). We worked 8 months on the project. $12 \text{ hrs} \times 8 \text{ months} = 96 \text{ hours}$ $96 \text{ hours} \times 6 \text{ people} = 576 \text{ man hours}$ (I added the contractor in with the average of 5 kids for a total of 6)

The last week of greenhouse construction took place at the end of May, building the pad and foundation as well as moving the greenhouse from the building site (my classroom). An additional 120 hours for backhoe and gravel work as well as assembling the greenhouse on the pad.

At this point, although not complete, we had a functional greenhouse.

Total work up to this point – 700 hours

Still to do – finish insulating, wire exhaust fan, incorporate wind and solar panels.

6. Assigning Tasks to Participating Students

The learning curve was very steep and a fair amount of time at first was spent on educating students about the various tools they would be using as well as methods to use the tools. **SAFETY** was a major factor. Protective eyewear was mandatory on the job site as well as constant observation of students using ‘dangerous’ tools. Some students were very interested in developing power tool construction skills, while others were content to hammer nails and paint, choosing to avoid the power tools. Others found their niche in being the ‘go fer’.

Now for the fun part!

7. Prepare List of Products to be Grown

What you chose will depend on what your interests are. Our original interest was to supply the herbs, garnishes and possibly salad greens for our High School’s culinary class which caters many dinners through out the school year. Due to the fact that we got such a late start on the growing part of our project, we received donations of starts – tomatoes, cucumbers, peppers, various flowers, basil and celery. Our first season of growing was spent working the kinks out. When did the exhaust fan need to be turned on? How often should we water? Keeping track, twice daily of greenhouse temperatures, etc.

8. Consult with experts regarding plants, lighting, soils, etc.

Again, put the word out that you are soliciting expertise on these various topics. We had a soils expert in our community who is planning on building a large commercial greenhouse in the future and

jumped at the chance to mentor youth with regards to our soil prep and soil amendments. Another garden guru turned us on to vermaculture for creating compost and even donated the worms. Parents worked with students during the summer to monitor watering needs and control greenhouse pests. Ladybugs were the aphid control of choice.

The project continues to grow with regards to the people involved. We are working on a program to get elementary afterschool science club kids working in the greenhouse with our high school FFA students. The green house is becoming the center of a 'garden' complex as outdoor raised beds will be built by the wood shop class at Kodiak High School. We are looking forward to increasing our production this coming growing season and hope to offer for sale products made from our produce at our Annual Fun on the Farm Celebration this fall.

Over the course of the project, students learned about or were exposed to:

- Building codes and the permitting process
- Basic building structure components
- Building tools – power and passive – safe use
- Types of board cuts
- HOW TO WORK AS A TEAM
- HOW TO FOLLOW DIRECTIONS
- Types of paint for outdoor applications
- Types of wood for outdoor applications
- Insulating materials
- Choosing wood for trim by analyzing grain, frequency of knots
- Types of glazing that would be appropriate for a Greenhouse
- Types of foundations appropriate for a greenhouse this size (12ft X16ft)
- Types of foundations that would increase passive heat collection
- Sources of top soil and issues associated with top soil
- Natural local soil augmentations (Beach Peat, fish bone meal, compost)
- Screening top soil for growing applications.

- Collecting 'containers' for the first years growing. (Next year we will have raised beds inside and outside the greenhouse, but due to the late growing start we stayed with containers)
- Creating a general all purpose soil medium that we could get started with.
- Repotting seedlings that were donated to the Greenhouse project
- Keeping a greenhouse log that all participants filled out
 - when working in the greenhouse during the summer (Monitoring greenhouse temp, watering, fertilizing, introducing lady bugs to control aphids, spraying soapy water for pest control, repotting plants when needed, etc)

Specific Challenges:

Keeping kids motivated during the building phase of the project. High School students are tired at the end of their school day, and helping them keep the vision of a completed green house in mind was a challenge!

We started the construction process outside, but it became apparent that soon the weather and lack of light would become a factor. We decided to move the project inside of my classroom (a large shop) The greenhouse was put together in modules that could be taken apart when the time came to move it to its permanent location. The challenge was working in a small space, and teaching my regular classes in an even smaller space!

Putting together a 'curriculum' that another teacher could use in a similar project would be a challenge in that I didn't have a specific number of students to work with on any given day. As this project didn't take place during a scheduled class, and all student time was volunteered, it would be difficult to take our experience and put it into 'modules, lessons, chapters, etc.

Successes:

The building of the green house inside my classroom became a daily advertisement for the project and Alaska Agriculture in general. The questions that students in my regular classes as well as students and teachers from other classes had about the greenhouse was a great way to spread the word about Alaska Grown, as well as agriculture in Alaska in general. Almost daily, conversations happened focusing on the greenhouse and its future!

Moving the greenhouse to its permanent home and assembling it outside became another venue for community and youth education, as folks would always stop to watch (sometimes help!) and ask questions. This was and continues to be a highly visible project. The greenhouse is located between the high school and the districts central office where there is a lot of foot traffic.

We had more than 50 guests (community members and school officials) at the official opening of the greenhouse.

Through the summer people are constantly stopping by the greenhouse to see the progress of the plants inside and out. At our fall teacher in-service this past week (Aug 20th), teachers came out to the greenhouse to eat their lunches, all the while asking questions about the project. Elementary teachers are asking how their students can become involved in the greenhouse and we are designing projects together with the high school FFA members mentoring the younger students.

'Crops' grown this year include: outside –broccoli, potatoes, chard, cauliflower, calendula flowers
Inside – tomatoes, cucumbers, peppers, various flowers, basil, celery.

The FFA students are proud of their accomplishments so far with this project. There is still a list of tasks to accomplish before the greenhouse is totally finished.

- insulate the walls
- install another window panel to let in more light
- research the best renewable source for heat and lights in

winter

-finish the deck on the east side

-build the greenhouse furniture (the woodshop class this fall has agreed to get involved with this part of the project as well as build the raised beds outside the greenhouse)

Kodiak High School FFA would like to thank the State Division of Agriculture for the opportunity to make the Green House Project a reality. We will continue fund raising this year to pay for the items needed to finish the greenhouse.

Respectfully submitted,

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Natural Resources

Maritime Science and Tech I and II

Basic Seamanship/Marine and Wilderness Survival Training