

## Greenhouse



A greenhouse is a structure, primarily made of transparent materials like glass or plastic, designed to cultivate and protect plants by creating a controlled environment. This environment is ideal for growing a variety of plants, ranging from flowers and vegetables that would not normally thrive in local climates or that can be affected by changes in weather pattern caused by climate change. Greenhouses can significantly strengthen communities in various ways, fostering not only agricultural development but also educational, social, and environmental benefits.

### Integration with international agreements

SDG 2, SDG 11, SDG 13

### Duration





A greenhouse can be installed in 5-10 days. The lifespan of a greenhouse largely depends on several factors, including the materials used in its construction, the quality of its build, the level of maintenance it receives, and environmental conditions. However, its use life is 5-10 years.

### Place of Implementation

- The selection of a suitable location for a greenhouse is crucial for its functionality and efficiency. Things to consider when installing a greenhouse are: Sunlight exposure, Access to Water, Wind Protection, Drainage, Accessibility, Availability of Space, Ventilation, & Slope.

**Beneficiaries** - A 50 X 100 greenhouse can serve an estimated student population of 1435 students. The number of beneficiaries will be dependent on the size of the structure, what is cultivated within and the use of the produce.

### Threats Addressed

- |  |  |
|--|--|
|  Increased temperatures |  Changes in rainfall patterns |
|  Heavy Rainfall         |  Drought                      |

## Social, eco-systemic and economic benefits

### Economic:

#### Local Food Production:

- Reduces food transportation costs and carbon footprint.
- Can lower grocery bills for community members through access to greenhouse produce.

### Social cohesion

- Strengthens community cooperation including at key locations such as schools and community buildings

### Education

- Climate Change Education: Greenhouses in schools and communities serve as excellent tools for educating people about climate change, sustainable agriculture, and environmental stewardship. They provide hands-on learning opportunities in subjects like biology, environmental science, and agriculture and enhances understanding of sustainability, plant life cycles, and food production



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## Main Climate Impacts & Threats Addressed



### Water scarcity:

Greenhouses often use irrigation systems like drip irrigation or hydroponics, which are more efficient and reduce water waste. They are designed to recycle and reuse water, minimizing overall water usage.



### Weather Extremes:

Greenhouses provide a controlled environment that can protect plants from extreme weather conditions.



### Change in weather

**patterns:** They enable year-round food production, which can be crucial in areas where climate change has shortened or disrupted traditional growing seasons.

## Implementation

### 1 Site Selection

- Choose a location with maximum sunlight exposure.
- Ensure the site is level and has good drainage.
- Avoid areas under trees or where structures may cast shadows on the greenhouse.

### 2 Permit and Zoning Checks

- Verify local building codes, zoning laws, and any required permits for greenhouse construction.

### 3 Foundation Preparation

- Clear the site of debris, rocks, and vegetation.
- Mark the perimeter of the greenhouse using stakes and string.
- Decide on the type of foundation (e.g., concrete, wood, or directly on soil) based on the greenhouse model and local climate.

### 4 Materials and Tools Gathering

- Acquire all necessary materials specified by the greenhouse manufacturer, including the frame, panels, fasteners, and any additional accessories.
- Prepare tools required for assembly, such as screwdrivers, hammers, drills, level, measuring tape, and safety equipment.

## Installation Process

### 1 Foundation Installation

- For concrete foundations, pour concrete to the marked perimeter and level it.
- For wood foundations, secure treated lumber to the ground using anchors and ensure it is level.

### 2 Frame Assembly

- Assemble the greenhouse frame according to the manufacturer's instructions. This typically involves connecting metal or PVC pipes or wooden beams.
- Ensure the frame is square and level at every step of the assembly.

### 3 Panel Installation

- Install the panels (glass, polycarbonate, mesh or plastic) onto the frame. Begin from one corner and progress systematically to ensure proper alignment and fit.
- Secure the panels with the provided fasteners, clips, or glazing strips, ensuring a tight fit to prevent heat loss.

### References

1. Schiller, Lindsay. Year-Round Solar Greenhouse: Step-by-Step Guide to Design and Build Your Own Passive Solar Greenhouse in as Little as 30 Days without Drowning in a Sea of Technical Jargon. Small Footprint Press, 2021.
2. Castilla, Nicolás. Greenhouse Technology and Management By. CABI, 2013.
3. Gatter, Mark, and Andy McKee. How to Grow Food in Your Polytunnel: All Year Round. Green Books, 2010.
4. Boodley, James William, and Steven E. Newman. The Commercial Greenhouse. Delmar Cengage Learning, 2015.

#### 4 Door and Vent Installation

- Install the door frame and door according to the instructions, ensuring it opens and closes smoothly.
- Fit any roof vents or side vents, making sure they operate correctly for adequate ventilation.

#### 5 Utilities Setup

- If required, install electrical wiring and plumbing for lighting, heating, and irrigation systems, adhering to local codes and safety standards.
- Ensure all utilities are tested and functioning correctly.

## Post-Installation

#### 1 Interior Setup

- Install any interior shelving, potting tables, or plant supports.
- Plan the layout to maximize space and light exposure for plants.

#### 2 Landscaping and Exterior

- Consider adding exterior paths, gutters for rainwater collection, and shading materials if necessary.
- Landscape around the greenhouse to enhance drainage and aesthetics.

#### 3 Final Inspection and Maintenance Plan

- Conduct a thorough inspection of the greenhouse to ensure all components are securely installed and functioning.
- Develop a maintenance plan covering cleaning, checking for damage, and ensuring the ventilation and heating systems are operational.

## Safety and Maintenance Tips

- Always follow the manufacturer's instructions and safety guidelines during installation.
- Regularly inspect the structure for damage, especially after extreme weather conditions.
- Keep the greenhouse clean to prevent disease and pests.

## Important Factors to Consider

1. Target Crops: Determine what types of plants or crops you plan to grow early, as this will influence many other decisions
2. Accessibility: Easy access to water, electricity, and other utilities, as well as for people who will work in or visit the greenhouse is important to consider
3. Drainage: Proper drainage to prevent waterlogging and disease.



## Indicators

### Implementation

Number of greenhouse systems installed

Number of schools or community groups using greenhouse to support NbS farming practices

Number of direct beneficiaries (% of which are females)

### Quantitative

Percent change in sustainable practices and behaviors in the community or school as a result of the greenhouse utilization

### Qualitative

Percent of schools which have applied targeted improved NbS practices or technologies in their curricula

## Costs and inputs

School Greenhouse Size:	Cost in USD
15X25	
Labour:	1,960.78
Equipment & Tools	3,267.97
Technician	1,307.19
Total	6,535.95