



Bioclimatism and passive solar housing in Afghanistan



With the support of the French Global Environment Facility:



PLAN

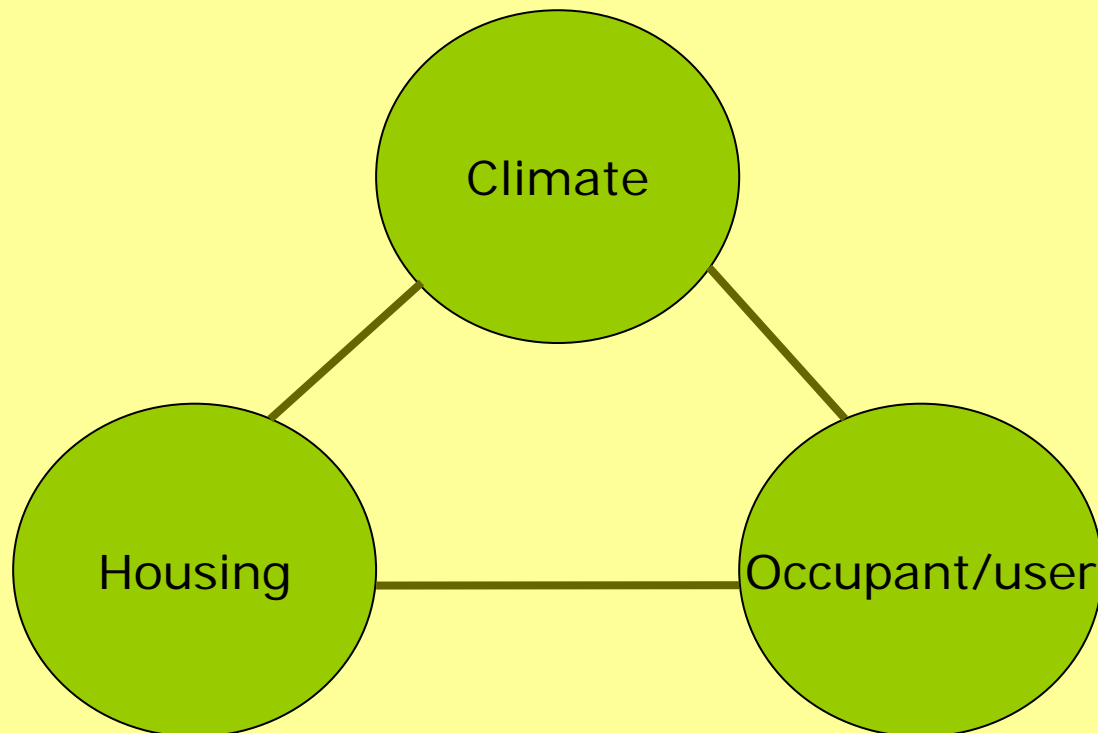
- **Introduction**
- **Bioclimatism definition**
- **Bioclimatism guidelines**
 - Capture the heat
 - Diffuse the heat
 - Keep the heat
- **Passive Solar House (PSH)**
- **Conclusion**



Solar architecture design

Introduction

- **Bioclimatic architecture consists in finding the appropriateness between housing, users behaviour and climate.**

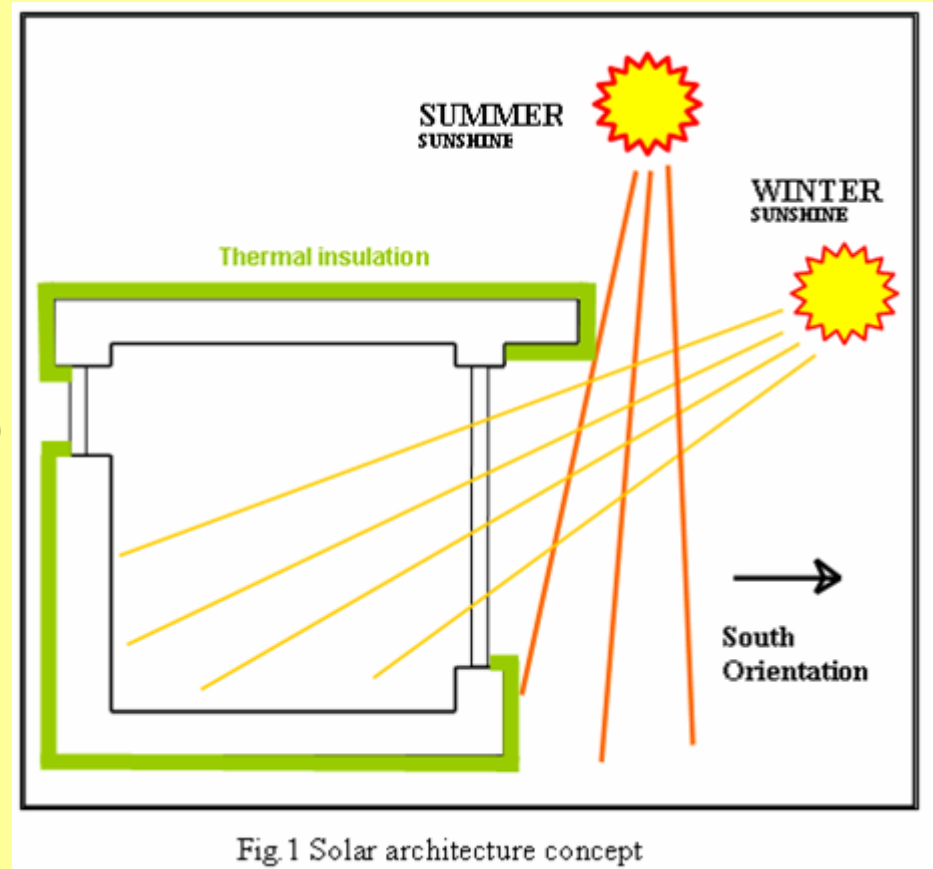


Bioclimatism principles

- The 3 rules
 - Capture the heat
 - Transform and diffuse the heat
 - Keep the heat

Bioclimatism

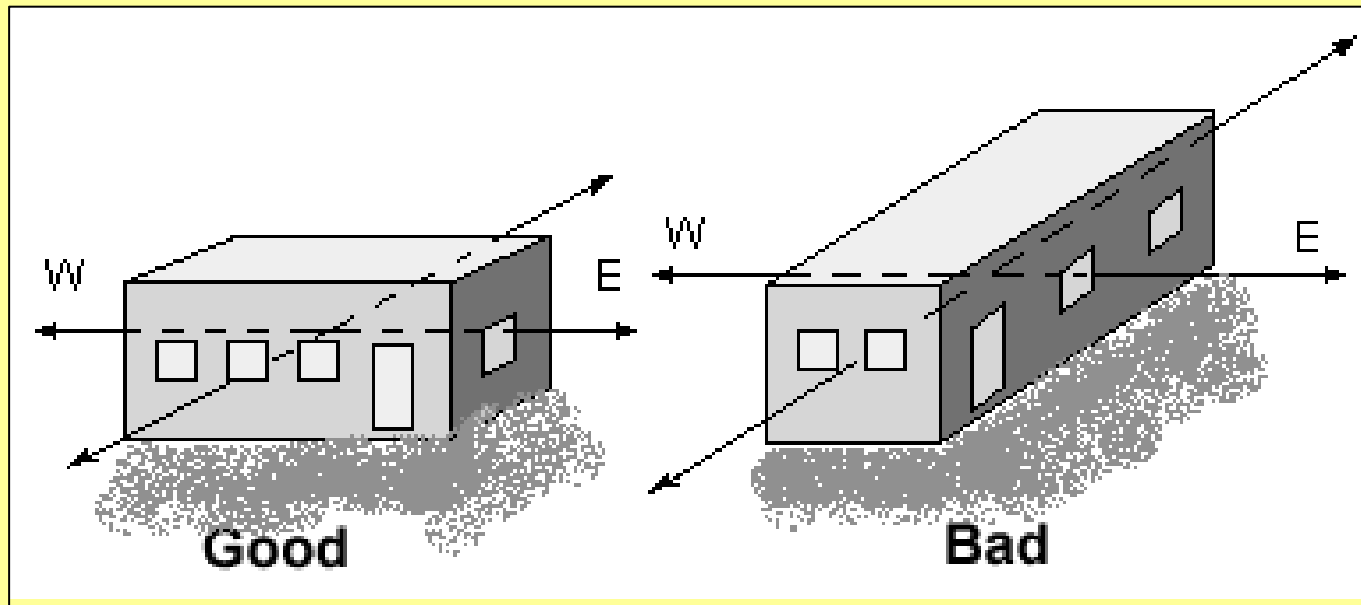
- How to do it ?
- Reduce heating and cooling needs
- Use solar gains (Winter)
- Avoid overheating (Summer)
- Stock and restitute heat



A/Capture the heat

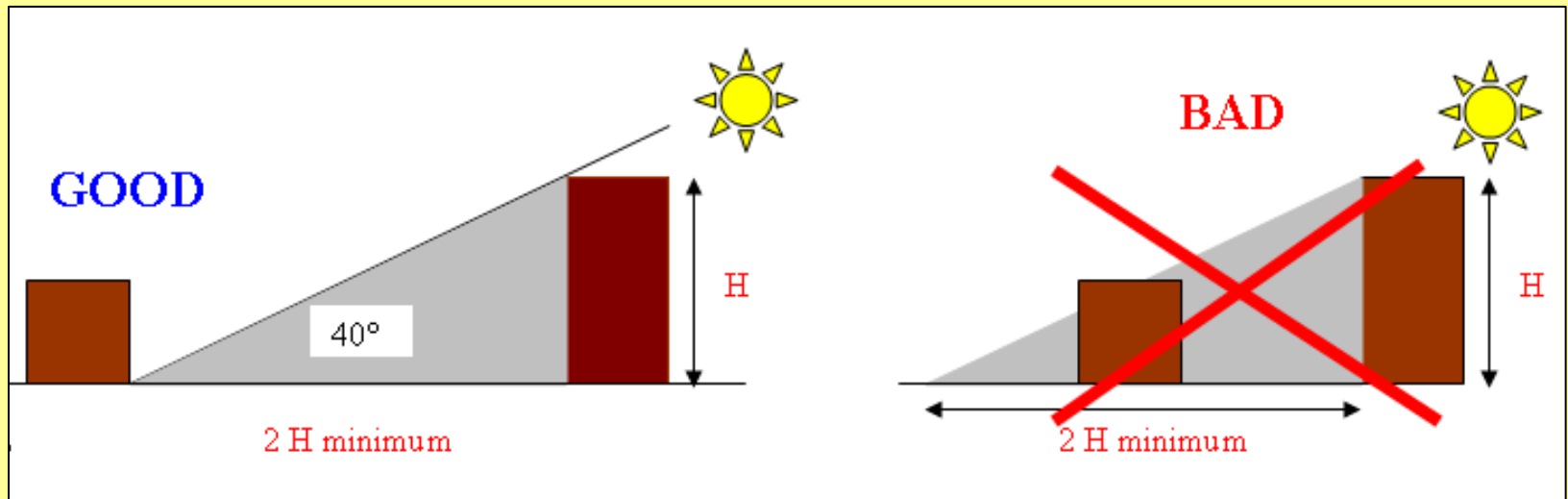
- **South orientation** = heat gains

- **The large face of the building will face the South**



A/ Capture the heat

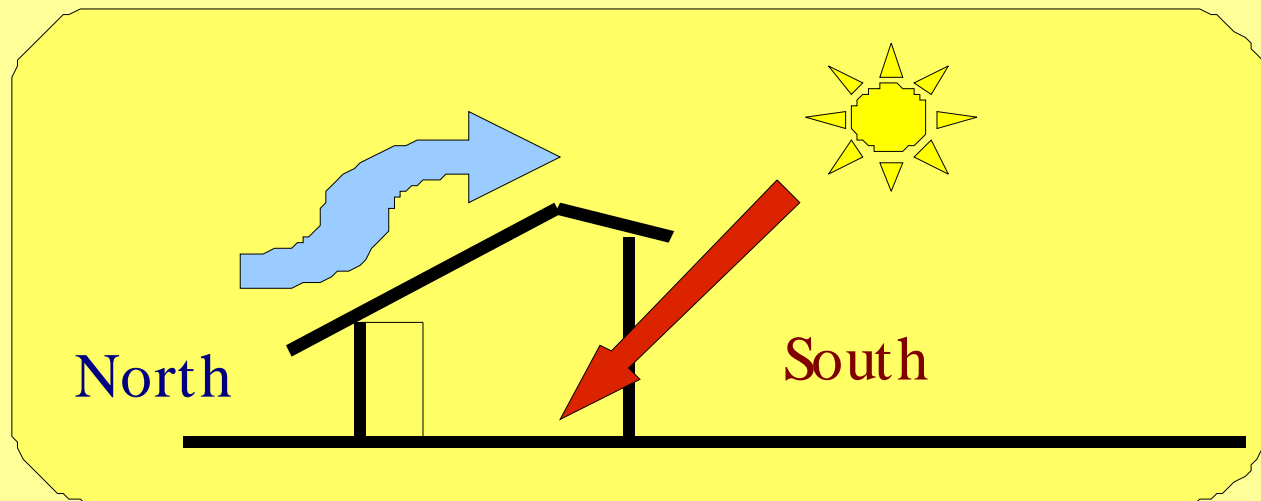
- Prevent from shading



- The **far obstructions** are the mountains, the landscape.
- The **nearby obstructions** are the buildings, the trees...

A/Capture the heat

- **Building shape: Asymmetric and compact**
 - **High and large South face** with windows to allow a maximum of solar gain
 - **Small North face** to reduce heat losses



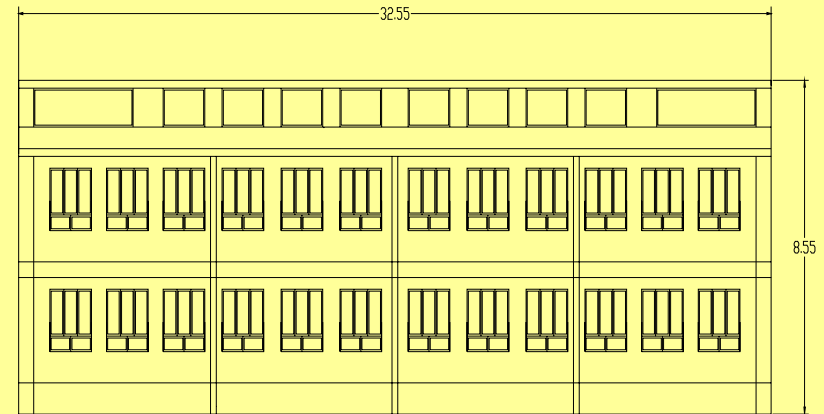
Passive solar shape

A/Capture the heat

- **South face** of the building with **large windows**



Bioclimatic school, charikar district

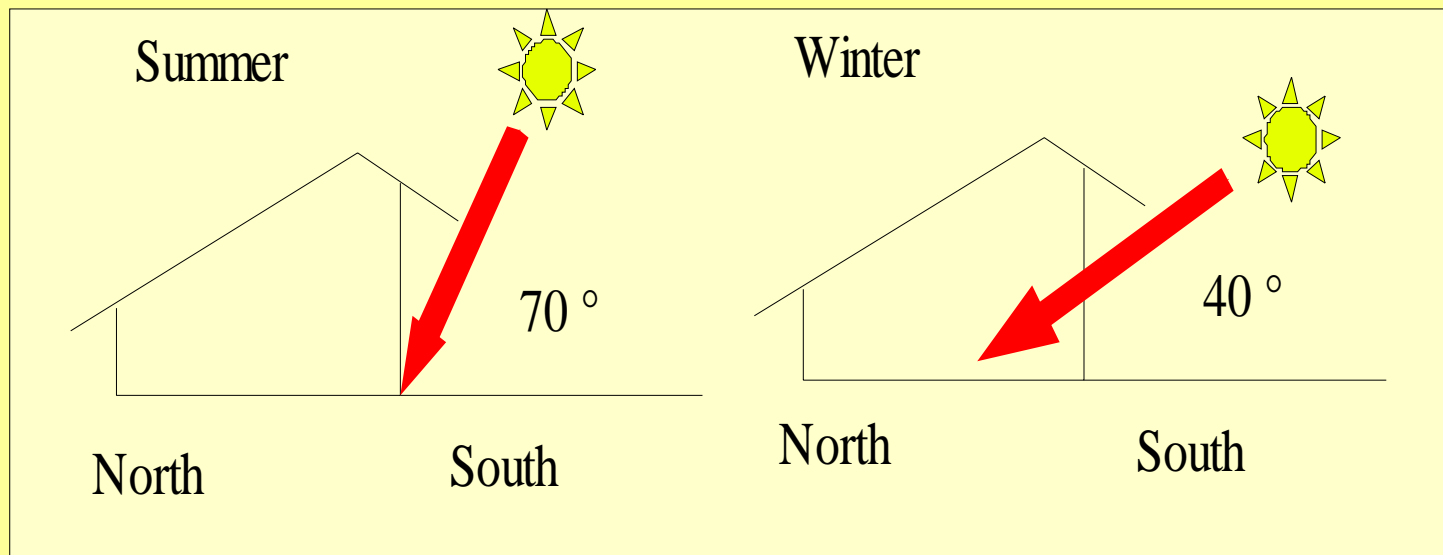


South face of a building

A/Capture the heat

- **Roof overhang**

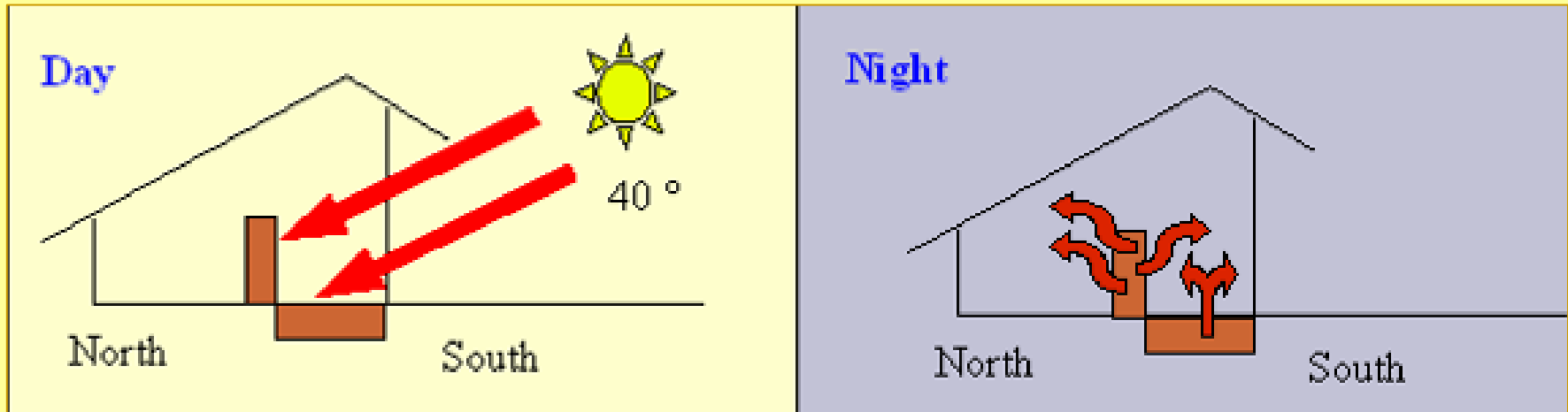
- Allow **sun beams** to get in only during **winter**



B/Diffuse the heat

- **Thermal inertia**

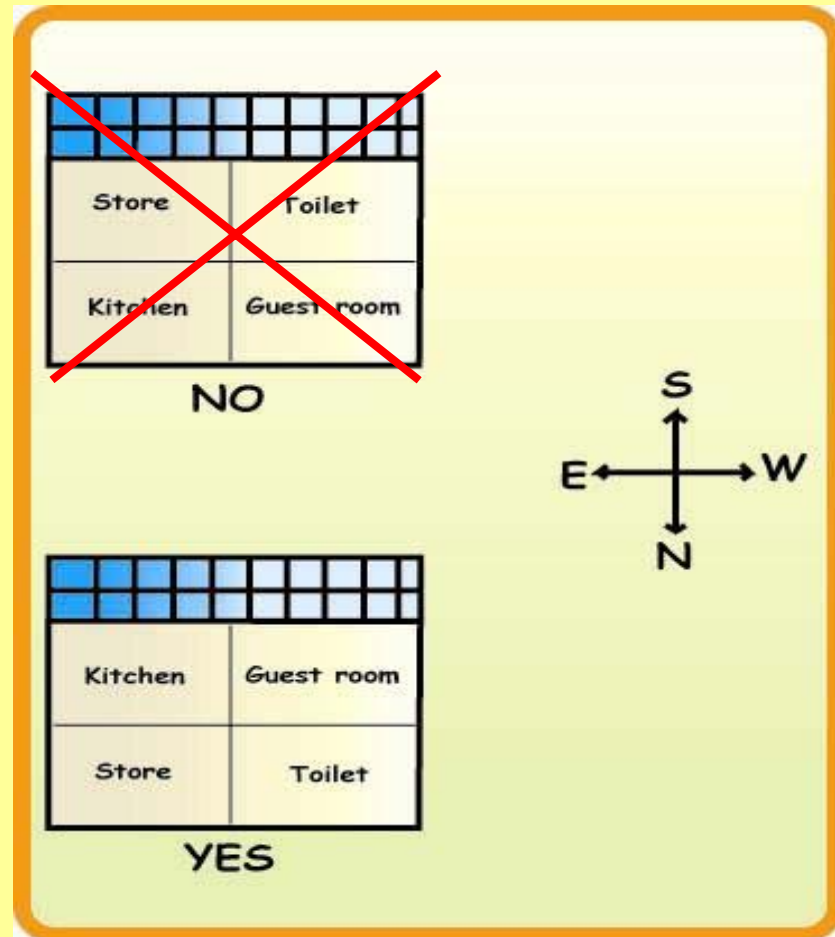
Heavy materials (stones, mud,bricks...) **inside south parts** of the building store the heat during the day and release it at night.



B/Diffuse the heat

•Rooms layout

- The rooms used in winter are located on **south side**.



Layout of rooms' concept

C/Keep the heat

- **Two types of insulations**

- **Internal insulation:** Walls, roof and floor are insulated **from inside** the building



Internal insulation

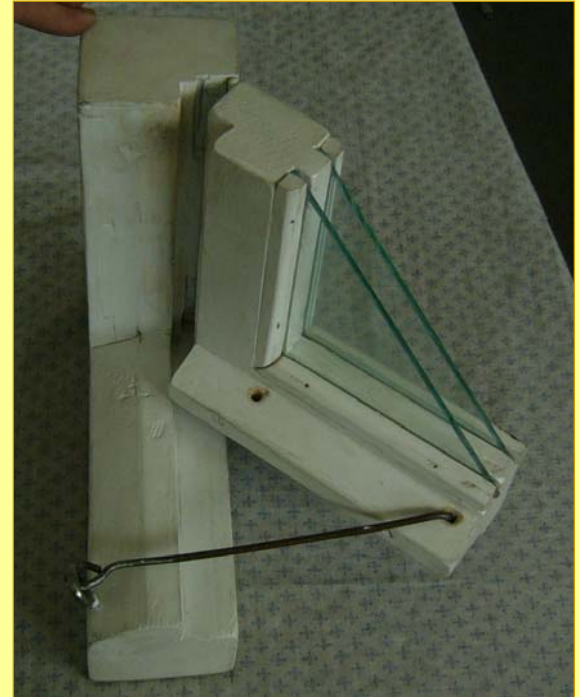
- **External insulation:** Walls and roof are insulated **from outside** the building



Outside insulation

C/ Keep the heat

- **Double glazing**
 - ❑ **Double glass improves** thermal insulation by **40% compared to a single glazing** window
 - ❑ it is also better for noise insulation.



Double glazing window

Passive Solar House (PSH)

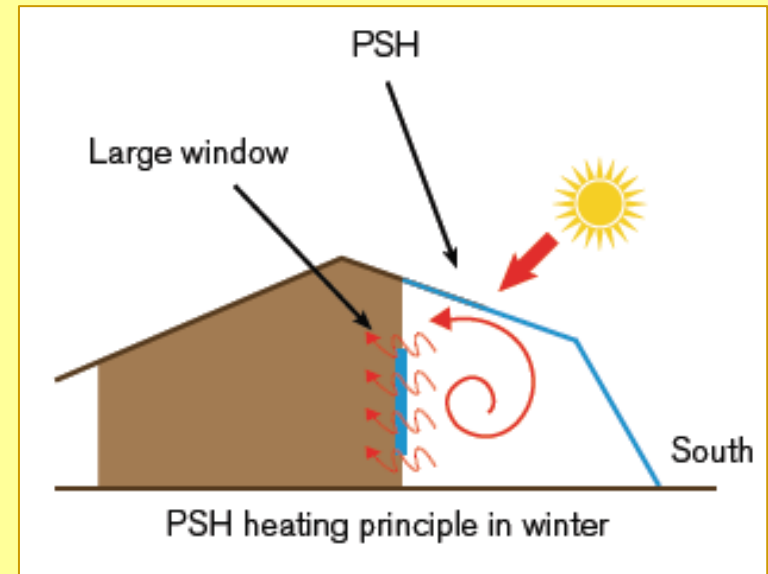


In winter:

The **south oriented veranda** made with plastic sheets use the energy of the sun to **heat up the building** through its large windows.



PSH in winter



Passive Solar House (PSH)

In summer:

- ❑ **Plastics sheets are removed** (and saved for next winter) to **avoid overheating in the building.**
- ❑ The **veranda is affordable, adaptable** and built with **local materials** then easily replicable



PSH in summer

A bioclimatic tool: the PSH

Advantages:

- Inhabitants welfare
- Housing sanitation
- New living space in winter
(craft activities)
- Fuel saving (40%)
- Natural resources preservation
- **Price per m²?????????**



Inside a PSH



Bush collecting

CONCLUSION

Bioclimatism consists of two techniques:

- ❑ **Solar architecture**
- ❑ **Thermal insulation**

These techniques are:

- **Simple**
- **Easily implemented**
- **Common sense, applied by ancestors**



Bioclimatism consists in decreasing the quantity of energy used with a better level of comfort.

CONCLUSION

Bioclimatism and **PSH** means:

- **Higher level of comfort**
- **Smaller energy bill**
- **Limit deforestation**

So bioclimatism and **PSH concept** is considered at mid-term business strategy to **save money and natural resources** on long term basis

Thank you !

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