HOKKAIDO UNIVERSITY

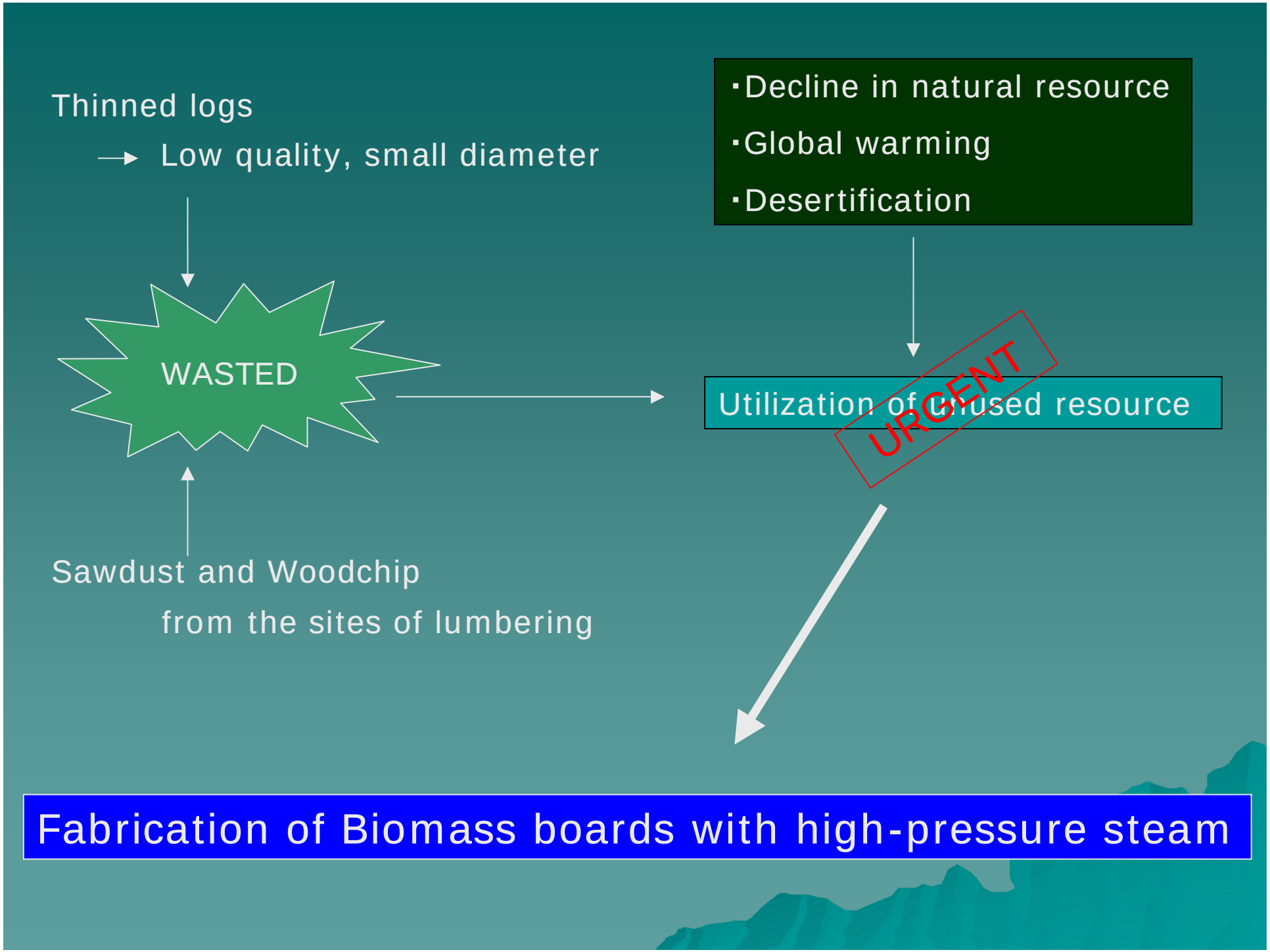
Title	Concept of Using Biomass Boards for Greening Deserts
Author(s)	Nakamura, S.; Hashizume, S.; Futamura, S. et al.
Relation	国際会議「持続可能な農業と環境」. 平成20年7月2日～平成20年7月6日. 札幌市
Issue Date	2008-07-04
Doc URL	https://hdl.handle.net/2115/34420
Type	conference presentation
File Information	31-026.pdf

Hokkaido University Collection of Scholarly and Academic Papers : HUSCAP

Concept of Using Biomass Boards for Greening Deserts

S.Nakamura, S.Hashizume, S.Futamura,
S.Onwona-Agyeman, M.Tanahashi

Biomass Conversion Lab., Gifu University


Thinned logs
Low quality, small diameter
WASTED
Sawdust and Woodchip
from the sites of lumbering
·Decline in natural resource
·Global warming
·Desertification
Utilization of unused resource
URGENT
Fabrication of Biomass boards with high-pressure steam

Biomass board is...

No Chemicals

Eco-Friendly
→ Biodegradable
Easy to recycle

Compressively molding with high-pressure steam method

Softening at 120℃

⇩

Compression to the targeted density

⇩

Shape fixation at 180℃

Fixation of entanglement between particles causes the adhesion

・Increase in cellulose crystallinity

・Transformation of cellulosic crystalline structure

→ Applied to shape-memory treatment of fabric materials

+

TiO_2

From Sawdust

Photocatalytic board

From Cotton

From Paper

Physical strength of board (Red lauan)

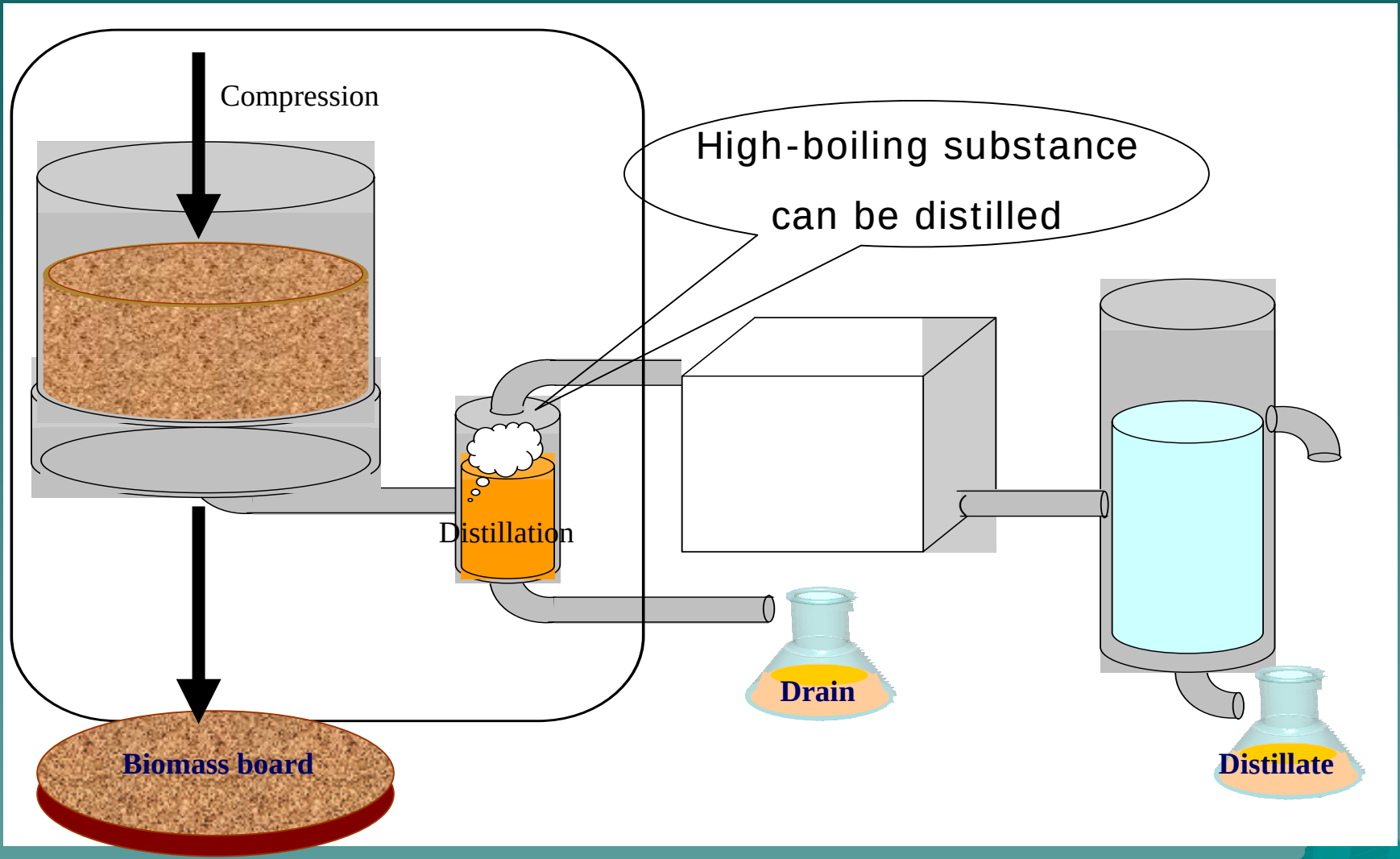
Material	IB(MPa)	MOR(MPa)
Sawdust	0.980	11.5
Wood-fiber	1.28	40.8
JIS Standard (MDF Type5)	≥ 0.2	≥ 5.0

Boards with certain strength

⇩

Construction material
Interior material

Furthermore...



TOTAL UTILIZATION OF WOOD RESIDUE is possible

with using high-pressure steam distillation method

Desertification and Soil Erosion

Deforestation and Heavy grazing

Vegetation removal

-Lack of nutrient
-Lack of water
-Soil erosion

Hard to forest

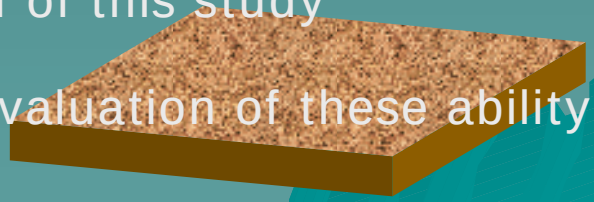
Desertification

As mulching material

Soil moisture control
Soil temperature control
Erosion control
Fertilizer supply

The aim of this study

Evaluation of these ability



Runoff Test

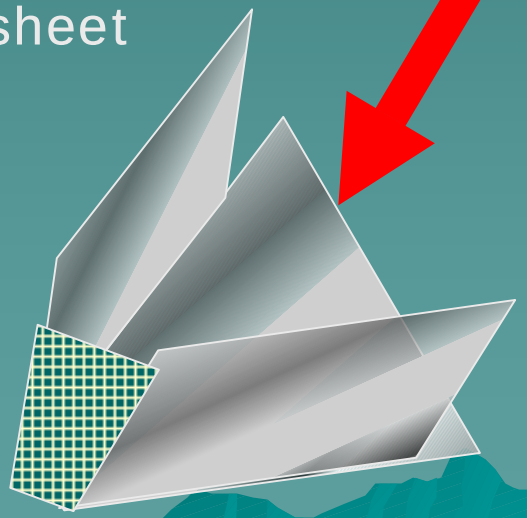
-Bare grounds were prepared by removing weeds

-Steep slope(30°）and gentle slope (5°）was prepared

-Funnel-shaped stainless plates were placed at the bottom edges of the slopes

15 areas of 120cm × 30cm were made with using corrugated plastic sheet

TOTAL: 30areas (15 in SS, 15 in GS)



Full-board area(FB)	4 pieces of Biomass boards (29cm×29cm×2cm) were placed to cover the whole surface
Half-board area(HB)	2 pieces of biomass boards were placed on the top and bottom edges of the slopes
Rice straw area(RS)	Rice straw was placed at 2-cm thick layer
Woodchip area(WC)	Woodchip (raw material of biomass boards) was placed at 2-cm thick layer
Bare ground area(BA)	No mulching

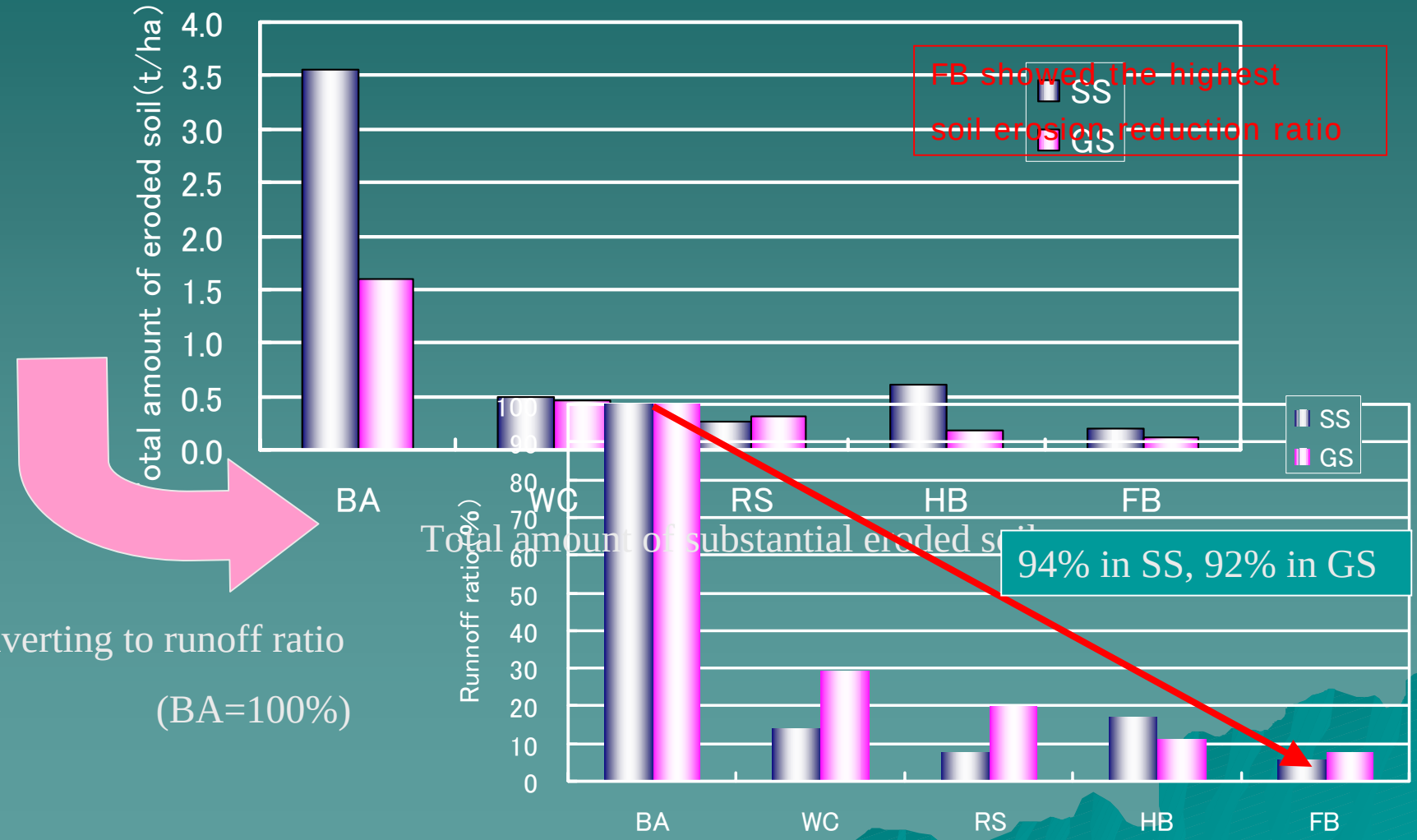
Biomass Boards

Obtained from Kaminoho Forest Cooperative

For mulching material and paving material

Period: Oct. 2006- Jan. 2007

Total rainfall : 254mm



Moisture Control Ability Test

400g of river sand was filled into plastic pot

- **Biomass board**
- **Rice straw**
- **Woodchip**
- **additional sand**

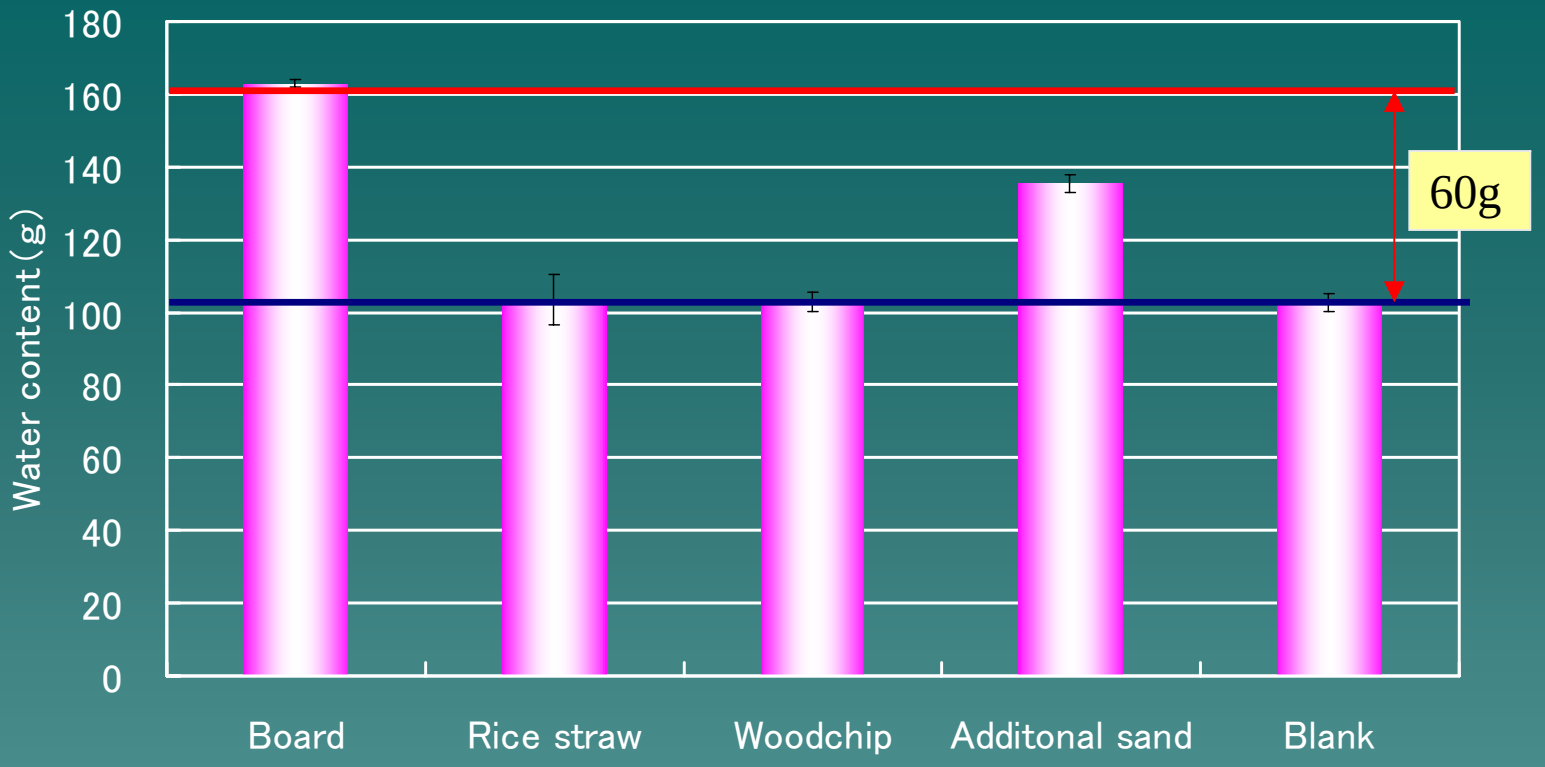
Placed to obtain same thickness as biomass board (2cm)

- **Blank**

200g of water was dropped using peristaltic pump

← Placed in a temperature controlled room (25℃)

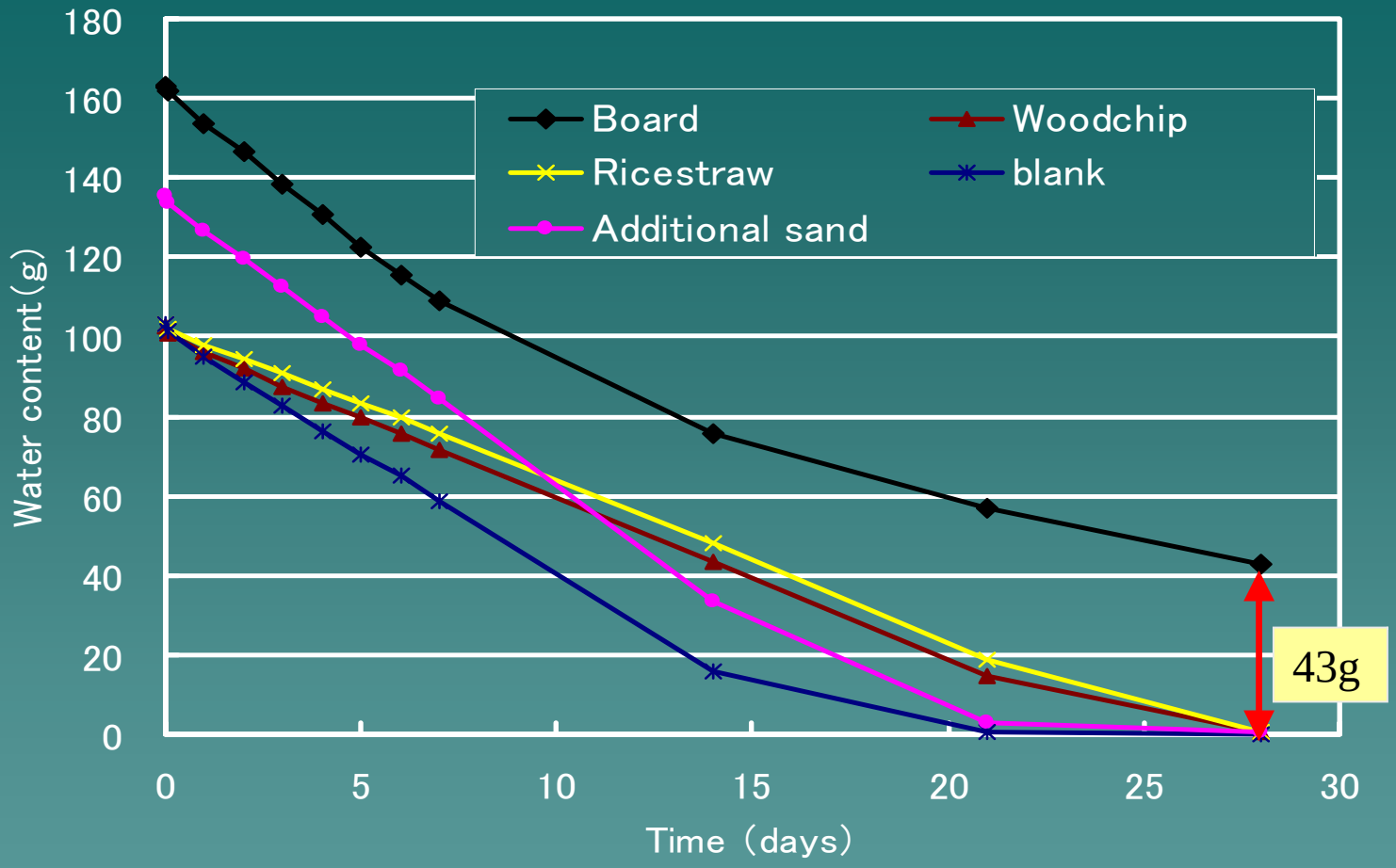
Moisture retention ratio was determined by weight change



Water absorption was drastically increased by laying biomass board

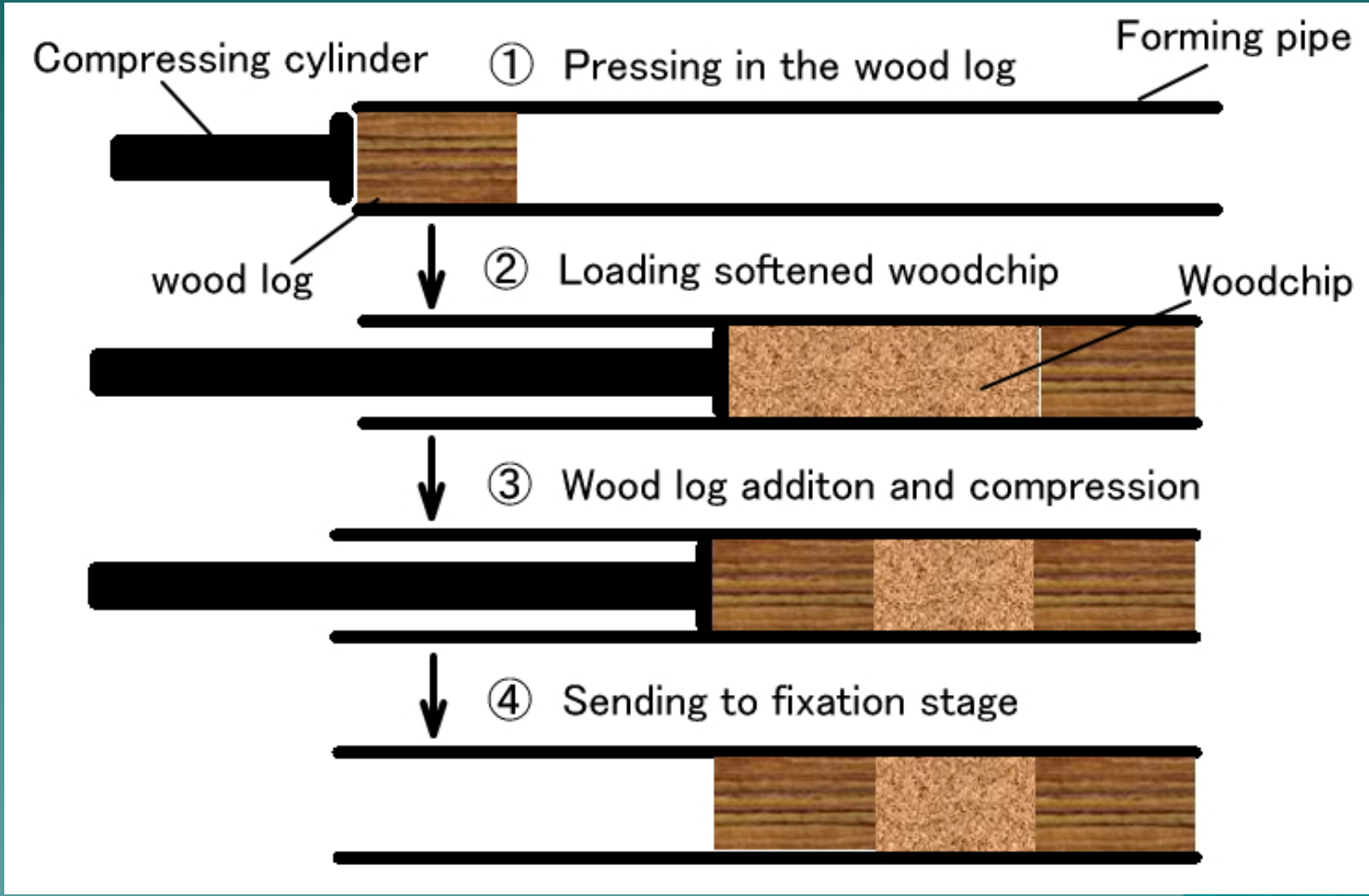
Board ⟶ Water was defused and efficiently absorbed

RS, WC ⟶ Water was allowed to go down to the sand layer



The pot with biomass board retained more than 40g of water even after 4weeks.

Development of Biomass Block



Some cracks were observed

↓

Lack of shape fixation?

Further investigation is required...

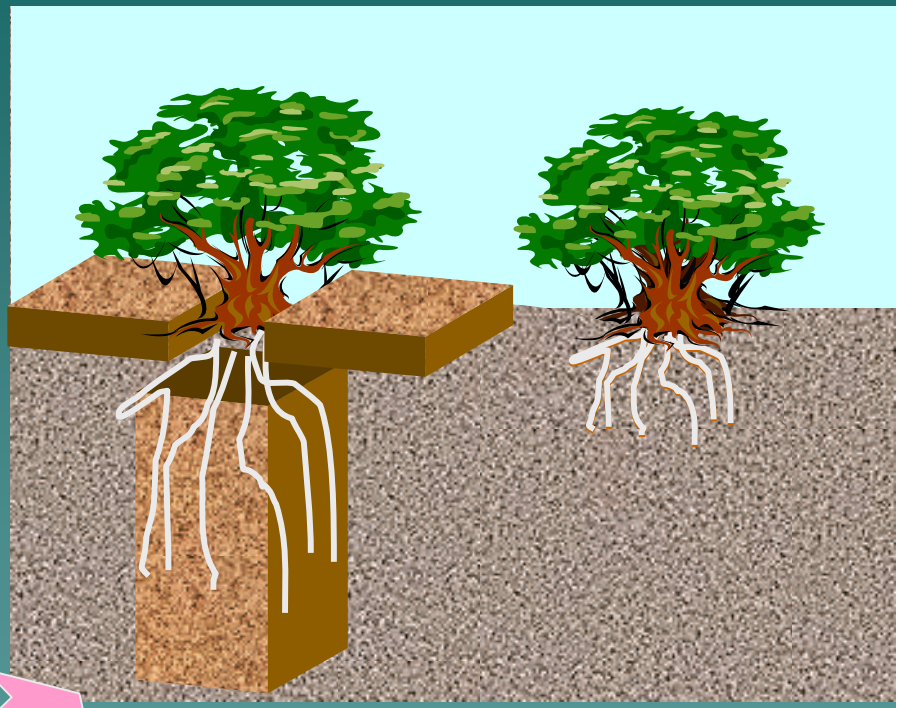
Conclusion

Significant reduction of soil erosion by board mulch

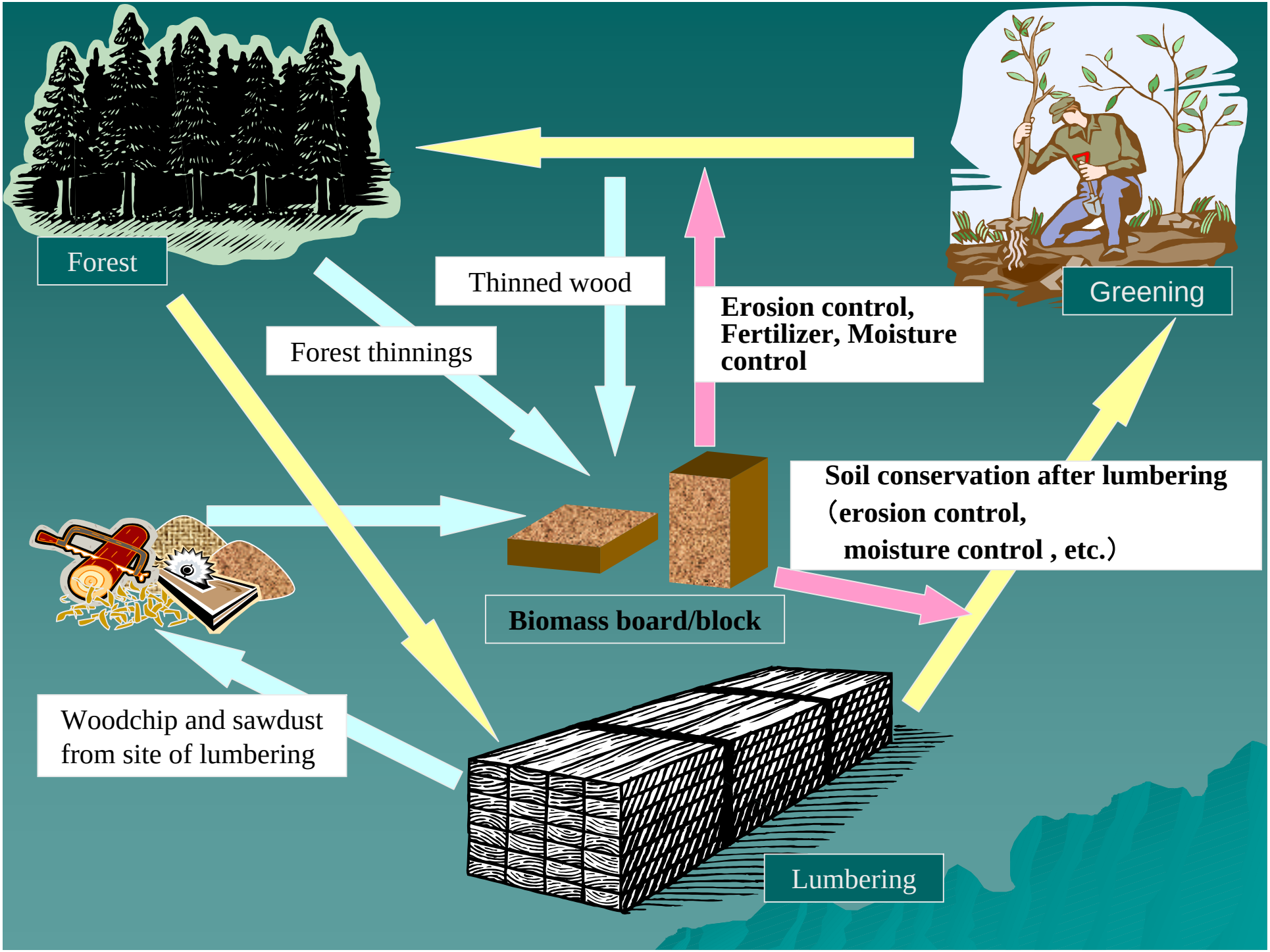
Temperature control

Availability as multi-functional mulching material

Fertilizer supply



Significant increase of water absorption and water retention


Forest
Greening
Thinned wood
Forest thinnings
Erosion control, Fertilizer, Moisture control
Soil conservation after lumbering
（erosion control,
moisture control , etc.）
Biomass board/block
Woodchip and sawdust from site of lumbering
Lumbering