

Assessment of revegetation efforts:
a suggestion for an evaluation scheme

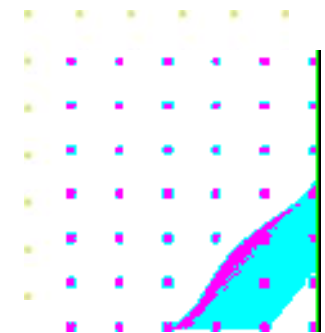


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6th European Conference on ECOLOGICAL RESTORATION
8-12 SEPTEMBER 2008 Ghent (Belgium)



Why is it necessary to assess revegetation efforts?



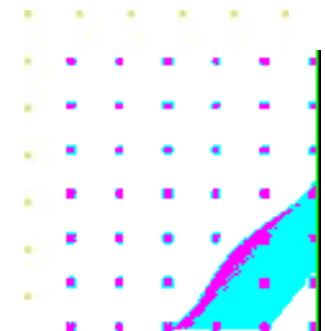
Example I. Kautokeino



straw
(100 %)
"Bon Terra"
ENRECO

Coconut fiber
(100 %)
ENRECO

Test of two different erosion control mats
10 years after revegetation



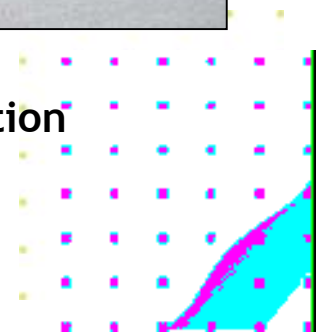
Example II. E6 Kværningen

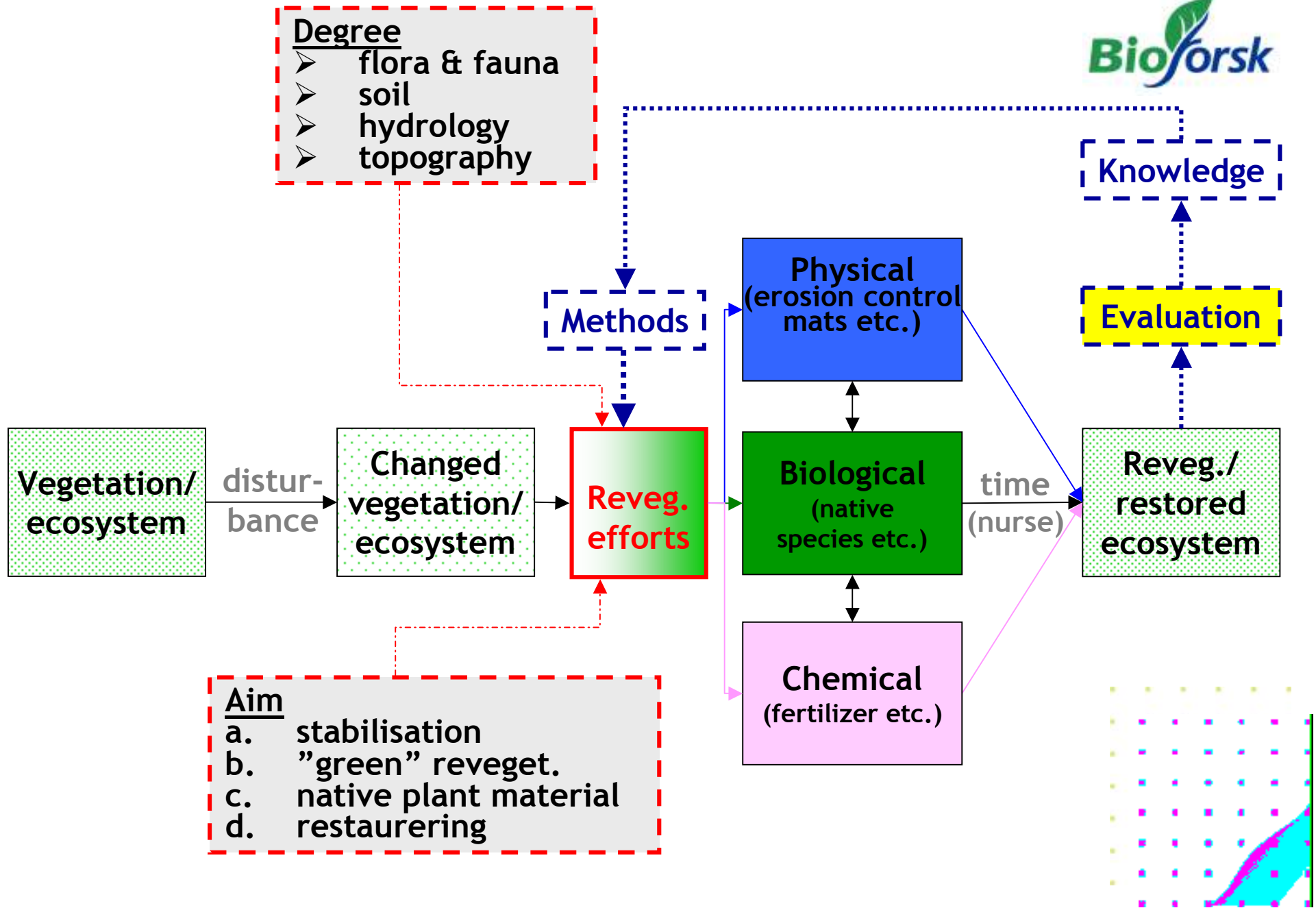


Roadside 10 years after revegetation



Photos: Gunhild Rosenfeld, Norwegian Public Roads Administration



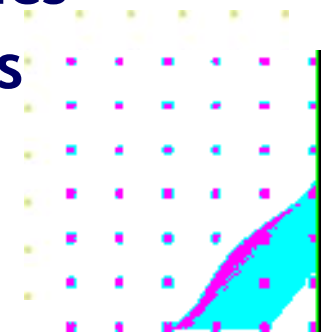


For a reasonable evaluation it is necessary with a:

a) adequate documentation of the key site specific physical and chemical conditions, like exposition, slope angle, soil texture, pH etc.

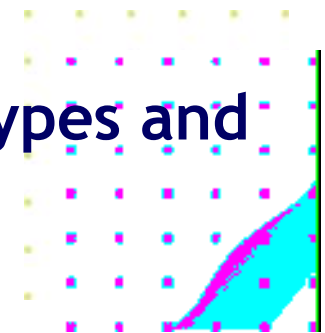
b) detailed documentation of applied material & methods, as type and amounts of seed mixtures, fertilizer etc.

c) Frequent documentation of ecosystem dynamics after for example 1, 2, 3, 5, 10, 15 and 20 years



Overall requirements for an evaluation scheme:

- a) registrations should be reasonable simple to accomplish, also for persons without scientifically background
- b) registration should not take “too long time”
- c) at the same time, results should give sufficient information on the overall state and dynamic of the restored site
- d) Possible application for different vegetation types and climatic zones



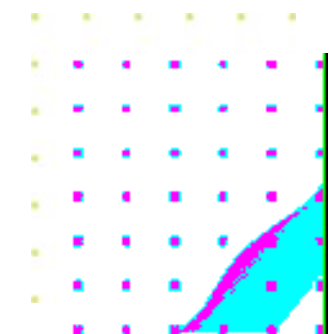
Suggestion for an evaluation scheme



I. Soil erosion: estimation of the type and degree of soil erosion. ¶

Soil erosion due to/initiated by*	I*	II*	III*	IV*	V*
Waters	☒	☒	☒	☒	☒
Winds	☒	☒	☒	☒	☒
Gravity (land slides)	☒	☒	☒	☒	☒
Human activities (hiking, vehicles, etc.)	☒	☒	☒	☒	☒
Animal activities (grazing, digging etc.)	☒	☒	☒	☒	☒
Others	☒	☒	☒	☒	☒
Overall estimation of soil erosion	☒				

Soil erosion: I. not observed; II. < 5% of total area; III. 5-10% of total area; IV. 10-25%; V. > 25%; Overall estimation: A. none; B. insignificant; C. moderate; D. severe; E. critical. ¶



• **2. Erosion control mats and/or mulching material** ¶

☒	I☒	II☒	III☒	IV☒	V☒
<i>Organically-based materials:</i> ☒	☒	☒	☒	☒	☒
Resilience of key material	☒	☒	☒	☒	☒
Resilience of merging fibres	☒	☒	☒	☒	☒
Degree of integration into the soil	☒	☒	☒	☒	☒
Impacts on plants establishment and growth	☒	☒	☒	☒	☒
others☒	☒	☒	☒	☒	☒
☒	☒	☒	☒	☒	☒
<i>Inorganically-based materials:</i> ☒	☒	☒	☒	☒	☒
Overall resilience of material	☒	☒	☒	☒	☒
Degree of integration into the soil	☒	☒	☒	☒	☒
Impacts on plants establishment and growth	☒	☒	☒	☒	☒
Others☒	☒	☒	☒	☒	☒
• Overall estimation of erosion control mats ☒	☒				

Resilience: I. physical and chemical composition of the applied material basically not changed; II. minor changes in the physical and chemical composition (10-30%); III. moderate changes in the physical and chemical composition (30-50%); IV. large changes in the physical and chemical composition (50-70%); V. Specific identification of applied material only in fragments or not at all possible. Integration: I. fully integrated; III. moderate; V. none. ¶

Impacts on plants establishment and growth: I. favourable; III. neutral; V. negative. ¶

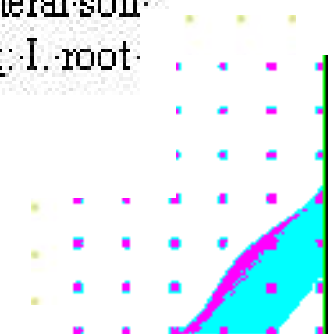
Overall estimation: A. essential; B. advantageous; C. neutral; D. hinder; E. negative. ¶



3. Soil-properties¶

☒	I☒	II☒	III☒	IV☒	V☒
Soil-moisture☒	☒	☒	☒	☒	☒
Soil-surface-litter-accumulation-(cm)☒	☒	☒	☒	☒	☒
Litter-integration-into-mineral-subsoil☒	☒	☒	☒	☒	☒
Organic-horizon-(cm)☒	☒	☒	☒	☒	☒
Mineral-soil-humus-content-(%)☒	☒	☒	☒	☒	☒
Average-rooting-depth-(cm)☒	☒	☒	☒	☒	☒
Root-development☒	☒	☒	☒	☒	☒
Substrate-stability☒	☒	☒	☒	☒	☒
Others☒	☒	☒	☒	☒	☒
Overall-estimation-of-soil-properties-on-plant-establishment-&-growth	☒				

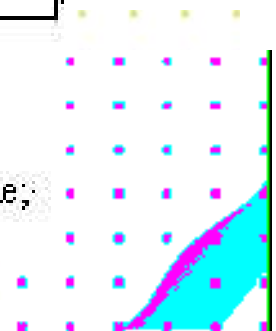
- Soil-moisture: I. wet; III. mesic; V. dry; Litter-accumulation: I. >3 cm; II. 2-3 cm; III. 1-2 cm; IV. <1,0 cm; V. <0,5 cm; Litter-integration: I. very good; III. moderate; V. none; Mineral-soil-humus-content: I. <0,5%; II. <1,0%; III. 1-2%; IV. 2-3%; V. >3%; Root-development: I. root-carpet, III. good; V. poor; Stability: I. High; III. moderate; V. high;¶
- Overall-estimation: A. advantageous; B. uncertain; C. hinder.¶



4. Plant establishment and growth ¶

☒	I☒	II☒	III☒	IV☒	V☒
Total plant cover (%)☒	☒	☒	☒	☒	☒
<u>lignoses</u> > 30 cm	☒	☒	☒	☒	☒
<u>lignoses</u> < 30 cm	☒	☒	☒	☒	☒
<u>graminoids</u> (grasses)☒	☒	☒	☒	☒	☒
<u>herbs</u> ☒	☒	☒	☒	☒	☒
<u>leguminoses</u> ☒	☒	☒	☒	☒	☒
<u>cryptogames</u> (lichen & mosses)☒	☒	☒	☒	☒	☒
Cover target vegetation (%)☒	☒	☒	☒	☒	☒
<u>vegetative reproduction</u>	☒	☒	☒	☒	☒
<u>generative reproduction</u>	☒	☒	☒	☒	☒
Cover target invading plant species☒	☒	☒	☒	☒	☒
Non-target invading plant species (weeds)☒	☒	☒	☒	☒	☒
Transplants.....cover (%)☒	☒	☒	☒	☒	☒
General appearance of plant growth, vitality☒	☒	☒	☒	☒	☒
Biomass production☒	☒	☒	☒	☒	☒
Usage by animals (grazing, digging etc.)☒	☒	☒	☒	☒	☒
Others☒	☒	☒	☒	☒	☒
Overall estimation of vegetation:	☒				

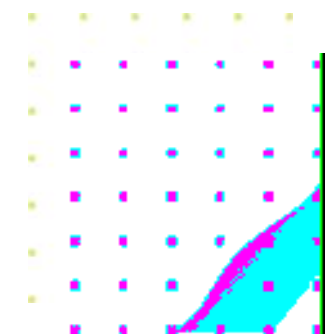
Plant cover (%): I. <5; II. 5-20; III. 20-40; IV. 40-70; V. > 70; Reproduction I. most; II. frequent; III. several; IV. few; V. none; Vitality: I. extraordinary; II. good; III. average; IV. reduced; V. poor; Biomass production I. high, III. medium, V. low; Usage by animals: I. Favoured; III. frequently; V. none; **Overall estimation:** A. excellent; B. good; C. acceptable; D. insufficient; E. critical-poor. ¶



• **5. After management efforts per year and m^2**

☒	I☒	II☒	III☒	IV☒	V☒
Labour (in hours)☒	☒	☒	☒	☒	☒
Supplementary materials†	☒	☒	☒	☒	☒
.....Seeds/ plants†					
.....Fertilizer†					
.....Watering†					
.....others☒					
Cutting and/ or removal of biomass☒	☒	☒	☒	☒	☒
Overall expenses ☒	☒	☒	☒	☒	☒
Others☒	☒	☒	☒	☒	☒
Overall estimation on after management	☒	☒	☒	☒	☒

Overall estimation: A. none; B. few; C. some; D. many; E. a large number. †



**We are looking forward to
a common evaluation and
a further development
of the evaluation scheme**



Thank you very much for your attention!

