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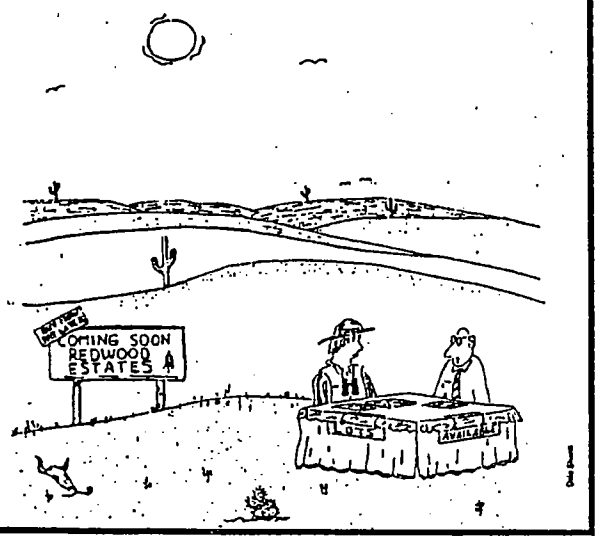
How to Plan A Restoration Project

You're absolutely right, my eagle eyed friend, it's not the wetland paradise we promised in the brochure. The folks in purchasing had a little trouble finding enough cattails and snipes, so we're installing a redwood forest instead. You'll love it. From your deck off the master bedroom you'll see deer, elk, butterflies, gigantic trees, and all manner of birds. Even condors, as soon as purchasing can locate a vendor.	Mel A. Propo's Domain 

1 - Project description in terms of goals

Define the problem - *Example:* ongoing sedimentation of spawning gravels.
Define the cause of the problem - *Example:* erosion caused by logging roads in upper watershed.
Define the goal - *Example:* halt erosion caused by logging roads in upper watershed
Don't automatically assume that a particular method is appropriate.

Bad: replant hill above Swift Creek
Good: prevent erosion upslope of Swift Creek

2 - Site inventory

Inventory the project site and area:

Soil characterisics

Type - sandy, rocky, duff, clay, hydric (wetland), etc.
Suitability for plant establishment - compacted, crusted, friable, etc.

Hydrology

Wetlands - the depth, velocity, timing, and duration of water transport into, through, and out of the system is critical.

Uplands - will moisture be adequate at the right time for seed germination and/or plant establishment? Could there be problems with erosion prior to vegetative cover establishment?

Structures

Are there logs or rocks available, such as from old log decks? They may be useful for terracing, besides providing establishment sites for species that tend to grow on rotting wood, such as Vaccinium (Huckleberry) spp.

100% Recycled Unbleached

Vegetation

Exotics - are there exotic (non-native) species on or near the site?

Rare species - are there any threatened, endangered, or sensitive plant species present on site or in the area?

Plant community on site - (coarse dominance and abundance rankings of individual spp.). What native species are growing on the actual restoration site? What is their relative dominance and abundance? Will they be destroyed by site preparation?

Plant community adjacent to the site and in the area - (coarse dominance and abundance rankings of individual spp.). What native species are growing adjacent to the actual restoration site and in the area? What is their relative dominance and abundance? Will they be impacted by site preparation?

3 - Site options analysis

Will "hard" methods be necessary?

For instance - ripping compacted soils or raking crusted soils, recontouring or otherwise altering the topography, tightlining water sources to prevent erosion, "armoring" a creek bank or outfall, etc.)

Will temporary structural erosion control be necessary?

For instance - erosion control matting, tackifier, etc.

Will temporary "soft" erosion control be necessary to prevent erosion or invasion of weeds?

For instance - a non-invasive cover crop

Will bio-engineering methods be necessary?

For instance - wattles, live staking, etc.

Will there likely be natural colonization of the site from the surrounding plant community?

Which species? How fast?

Will exotic (non-native) plant species likely be a problem?

What control strategies are feasible - quick establishment of natives, benign cover crops, cutting of the weeds before they go to seed, burning, burying the infested soil seed bank?

What plant propagules are/will be available in the area - plants, seeds, cuttings?

Which species? How much is potentially available for each species?

Consider possible initial target plant communities.

What would be the immediate effects? *Example:* slope stabilisation, halting erosion

What would be the future effects? *Eexample:* thick grass may prevent tree invasion

Might it be necessary to intervene on the site in the future? *Example:* plant trees in 5 years after establishment of the shrub layer

What strategies are available to provide sufficient quantities of each plant species?

Salvage - Plants that would otherwise be destroyed can be dug up (either by hand or machine), stockpiled (for instance, in a capillary bed), and then returned to the site and planted. With careful planning, it may be possible to avoid stockpiling and simply move the plants while site preparation proceeds.

Cuttings - Plants grown from cuttings tend to be shallower rooted than plants grown from seed. Is this important? Are there enough donor sources in the project area so removal of th

needed number of cuttings doesn't harm the population? Are there enough donors to assure appropriate genetic diversity? Can the cuttings be "stuck" directly on site, or will it be preferable to grow them on first?

Seeds - Is *direct seeding* on site feasible, considering the particular species, amount of available seed, and conditions on site? Is *seed banking* possible (i.e. is there sufficient lead time to allow collection and storage of seed for more then one year)? Is *bulking up* (growing out representative collections for seed production) feasible or desirable? For the particular species, considering conditions on site, and given the amount of available seed, is it preferable to produce plants off site (i.e. in a nursery or greenhouse)?

What strategies are possible for establishment on site of each desired species?

Relying on *natural colonization*
***Salvaging plants* that would otherwise be destroyed and planting them back on site**
Direct seeding
Sticking cuttings
Using *plants grown off site*

Might predation be a problem?

What strategies might be used to prevent predation?

Pelletizing seed - *Example:* coating the seeds with a thin layer of clay

Planting a trap or sacrifice crop - *Example:* planting lupine for the Elk to eat, instead of the tree seedlings

Mixed plantings - *Example:* planting lupine with the tree seedlings

Physical barriers - *Example:* netting, fencing

Overplanting -

4 - Alternatives analysis - WIDE ranging

Analysing alternatives inevitably overlaps and informs the site options analysis, and vice versa.

Remember **- restoration is as much an art and craft as it is a science. There are no cookbook solutions.** *"Nature is not only more complicated than we think, it is more complicated than we can think."*

5 - Decision

Pick - target community
Pick - species / dominance/relative abundance
Pick - species establishment strategies
Pick - site preparation m ethods and techniques
Pick - erosion contol methods and techniques, as necessary

6- Project description

Include:

Site-specific goal - *Example:* stop erosion from logging road failure
Site specific method - *Example:* ripping, re-contouring, and re-vegetating

7- Project plan

Flesh out the project description in full detail:

Develop detailed specifications for different "parts" of the project - *Example:* erosion control methods; engineering/construction specifications; plant material specifications; etc.

Decide "standards for success:

Standards should be measurable - *Example*: 50% vegetative cover at end of first growing season; colonization by adjacent trees within 5 years

Create Monitoring plan:

Choose elements to monitor

Choose quantitive and qualitive data collection methods

Choose data collection schedule

Create Back Up plan:

Include intense short term monitoring and plan for rapid intervention in the event of establishment failure

8 - Determine the quantity and quality (specifications) of materials needed

This will likely include "hardware" and live material -

Example: 12 rolls of curlex erosion control matting; 2500 square feet of existing plants salvaged with a backhoe and replanted directly on site; 10 pounds of native bunchgrass seed; 20 - 2 year old Garry Oaks; etc. List the project supplies (seeds, cuttings, matting, etc.).

Be as specific as possible

9- Schedule/calendar

Develop a schedule/calendar for what has to happen when

Count backwards from the date when any supplies need to be on site

Be realistic:

Plant salvage can occur during site preparation with careful scheduling

Cuttings can be taken just before being used

Seed collection requires enough lead time to include "scouting" collection sites, the "harvest" season, and possibly time for processing (cleaning) also

Seed Banking - If more seed is required than can be collected in one season, then several years collection (and possibly storage) may be necessary

Bulking Up - Several years may be needed to grow on the initial collection for larger scale seed production

Plants - If needed, include at least another growing season after the seeds or cuttings are collected, or possibly longer, depending on the size of the plants desired

You say you don't have 2, 3, or more years lead time?

How long did the degradation take? Do you really think one year restoration projects work?

10 - Order materials

Give lead time for searching and contracting - it will be necessary

11 - Contract/schedule labor

Write qualifications into the RFP

Pray that the low bidder is competent, cooperative, and willing

12 - Congratulations! You're finished - almost

Now go back and doublecheck *everything*

Ask a colleague to review and comment on the plans

13 - The planning's done - *Kick back and wait for the inevitable snafu*