HABIT-CHANGE
adaptive management for protected areas

Planning for action!

Management plans that work for nature

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Photos: C. Werpachowski, P. Świątkiewicz, T. Kłosowski

Planning for action!

- Why to plan? What to be planned?
- Why management plans fail in implementation?
- Who expects what? Practicioners vs. Scientists
- Adaptive management
- Communication in environmental management
- Gate keepers vs. Boundary spanners

Why to plan?

- Enourmous pressures
- Decent changes of land use
- Internal and external factors
- Personal purposes (ecosystem services? Other gains?)
- Legal requirements
- Social demand
- The only thing we can be sure of is UNCERTAINTY of impacts and responses

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- Different sites – similar problems
- Problem of scale: to manage whole area equally, but with general approaches applied (*pret-a-porter*), or to manage the most important spots with the detailed approach (*haute couture)*

Fail compilation (1)

The equation (6) requires also determining of boundary conditions (most often of the type H(0,t) H(L,t)) as well as initial conditions. When the following equation is used

$$\frac{\partial H}{\partial x} + \frac{n^2 |Q| Q}{A^2} = 0 \qquad (7$$

it is possible to determine the discharge Q(x,t) once the solution H(x,t) and cross area of flow A ar known.

The data assimilation method in the form of 'nudging to individual observations' was applied in th analysed model of unsteady open channel flow (equation 6). The 'nudging' term (2), in which nudging weighting function $W = w_x \cdot w_t$, was added to the equation (6) and leads to the following form:

$$\frac{\partial H}{\partial t} + \frac{\partial}{\partial x}\left(\frac{n}{h^{5/3}\left|\frac{\partial H}{\partial x}\right|^{1/2}} \frac{\partial H}{\partial x} \right) = q + G \frac{\sum_{i=1}^{Nt}\sum_{k=1}^{Nx} W_{ik}^2(x,t)\varepsilon_k(x)(h_{oik} - h_k(t))}{\sum_{i=1}^{Nt}\sum_{k=1}^{Nx} W_{ik}(x,t)} \qquad (8$$

In a developed model the expression (8) is solved numerically using a fully implicit, finite-differenc approximation of the spatial terms and a Picard-iteration scheme for the non-linear terms (Ames, 1992).

?

Scientists involved in management plan preparation frequently solve problems of computation instead of solving the real-life problems

Fail compilation (2)

Fight of the year!

Vs.

Sponsored by:

Species? Usually protected areas focus on single species, whilst some habitat requirements suitable for one species is not desirable in case of the others…

Fail compilation (3)

- Different perceptions, variable backround, changing expectations,
- Money talks!
- Stakeholer dialogue does not mean the compromise!
- Involve as much of stakeholders as possible (in the epoque of *.pdf's it is easy!)

Whilst numerous stakeholders are involved in management planning, inapropriate communication makes management plans fail.

Who/How to communicate?

	Low influence	High influence
High interest	**SUBJECTS** *(Necessity to protect their interests through the specific initiatives)* **- Local NGOs** **- Children (local schools)**	**KEY PLAYERS** *(Necessity to establish good relationships with those stakeholders to ensure their cooperation and support for the project)* **- Farmers and land managers** **- Land Owners** **- Environm. Conserv. Directorate** **- Managers and staff of the BNP**
Low interest	**CROWD** *(These stakeholdersare not targeted by the project, but should be informed about specific initiatives)* **- Fishermen** **- Tourists (birdwatchers, canoers)** **- Hunters** **- Proprietores of unmanaged lands**	**CONTEXT SETTERS** *(These stakeholders represent significant risk and must be continuously monitored)* **- Local authorities** **- Regional Irrigation and Drainage Councils** **- (Local) politicians**

(Grygoruk et al., 2013 after Boumrane, 2007, Zarzo Fuertes et al., 2011, modified)

Boundary spanning

(Richter et al., 2006

$$\frac{\partial Q}{\partial x} + \frac{\partial (A_C + A_O)}{\partial t} = q$$

$$\frac{\partial Q}{\partial t} + \frac{\partial (\beta Q^2 / A_C)}{\partial x} + gA_C \left(\frac{\partial h}{\partial x} + S_f + S_{ec}\right) + W = 0$$

$$u = -\frac{K}{\mu}\frac{dP}{dx}$$

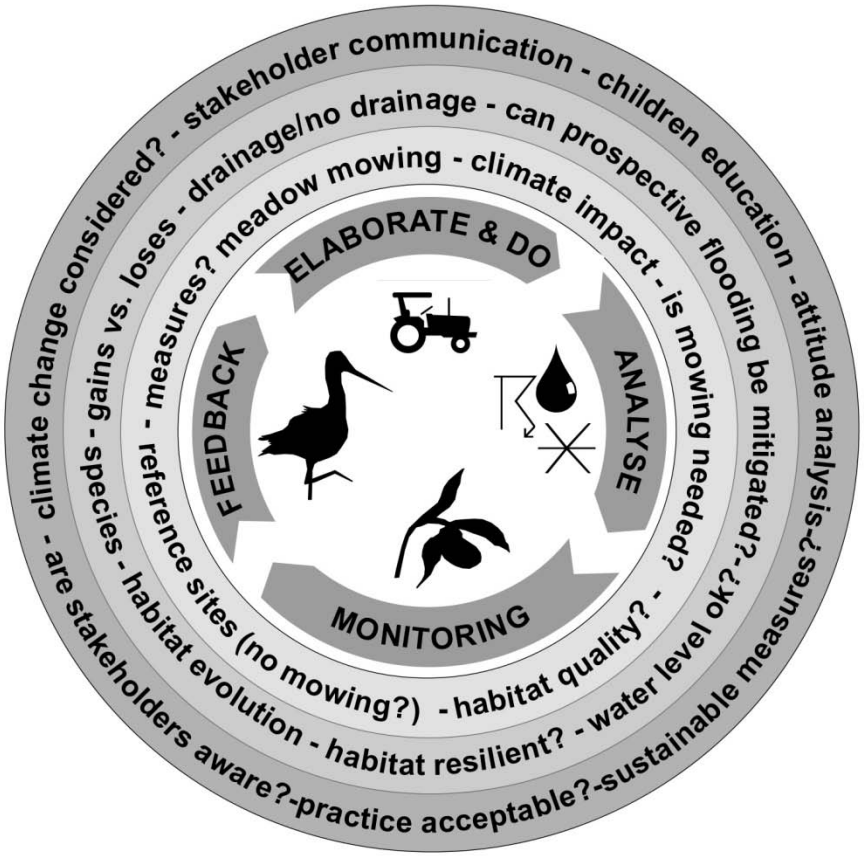
$$\frac{\partial}{\partial x}\left(kH\frac{\partial H}{\partial x}\right) + \frac{\partial}{\partial y}\left(kH\frac{\partial H}{\partial y}\right) = N + \phi\frac{\partial H}{\partial t}$$

EUR

In adaptive management of valuable ecosystems „spanning the boundaries”, means the transfer of knowledge from the world of science towards the stakeholders, which normally do not get neither „Darcies” nor „St. Venant’s”, but EURs.

Adaptive management

- Setup of the management plan
- Monitoring of implementation
- Reference sites – is management measure we apply still required?
- Adjustment of management measures
- Feedback analysis
- Is the protected area status appropriate (expected? Desirable? Be aware of transient states!)



(Grygoruk et al., 2013, in press)

Adaptive management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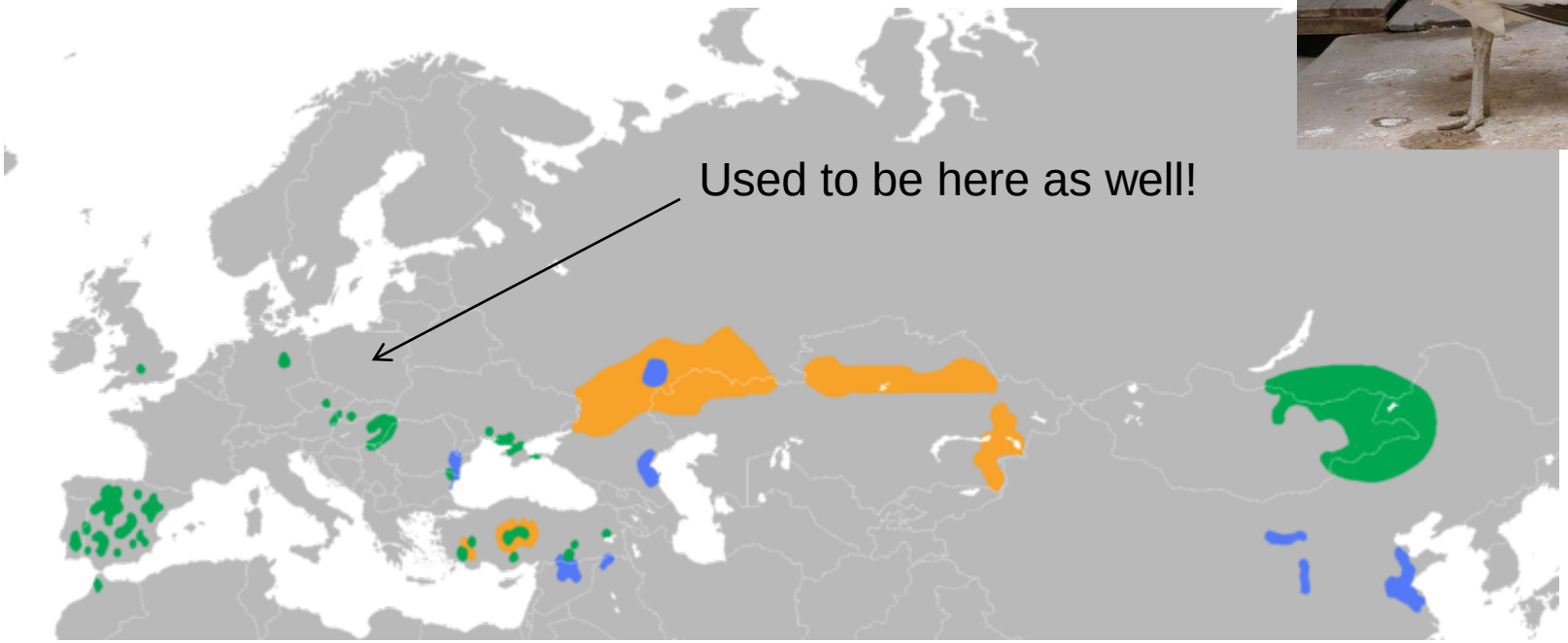
Otis tarda – why there?

-How the management plan you create for the Great Bustard can be adaptive?

- What is to be monitored in order to assure (?) this species' presence in Hortobagy?



(Source: Wikipedia)

Conclusions

- Prior to the management plan setup one should consider the scale of its implementation: Species? Habitats? Area?
- Define goals and verify if they are possible to be achieved with the given capacities
- Define monitoring criteria and policy
- Continuously check if the applied management actions are still required
- Be flexible in terms of the measures applied, but be strict in focusing at the subjects of protection and communication
- Expect the managment plan setters to work for you, so the management plans fulfill your practical requirements
- Communicate, but not go too far with compromises

Communication – a key!

We are the part of the ecosystem we manage!

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