

# Refilling the meanders of the Colostre

## The operation

|  |                         |
|--|-------------------------|
| Category                                       | Restoration             |
| Type of operation                              | Remeandering            |
| Type of environment                            | Intermediate river zone |
| Issues at stake (water, biodiversity, climate) | Good status of habitats |
| Start of operation                             | 1999                    |
| End of operation                               | 2001                    |
| Length of river affected by the works          | 11,000 m                |

## River in the restored section

|                    |                        |
|--------------------|------------------------|
| Name               | The Colostre           |
| Distance to source | 19.4 km                |
| Mean width         | 4 m                    |
| Mean gradient      | 0,01 ‰                 |
| Mean flow rate     | 0.67 m <sup>3</sup> /s |

## Aims of the project owner

- Restore the habitats of brown trout.

## Environment and pressures

The Colostre is a tributary of the River Verdon. It is 36 km in length and drains a catchment area of 215 km<sup>2</sup>. This typically Mediterranean river experiences very low water levels upstream of Riez and flash flooding due to storms. The Colostre is the only accessible tributary of the Verdon in this downstream section (compartmentalised by the EDF [French electricity supply company] dams), and on



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The Colostre canalised before restoration (1999)

## Location

|                |   |
|----------------|---|
| Country        | France  |
| River basin    | Rhône-Mediterranean (Méditerranée)                  |
| Region(s)      | Provence-Alpes-Côte d'Azur                          |
| Département(s) | Alpes-de-Haute-Provence                             |
| Commune(s)     | Riez, Allemagne-en-Provence, Saint-Martin-de-Brômes |



these grounds, constitutes one of the only breeding grounds for brown trout. The beaver has also been recorded in this area.

In the 1960s, following exceptional summer flooding, hydraulic improvements were made in order to modify the longitudinal profile of the river (resizing, straightening of the river and creation of weirs). These developments degraded the habitats of the river and caused significant erosion of the river banks.

|                     |                              |
|---------------------|------------------------------|
| Regulatory context: | Verdon Regional Natural Park |
|---------------------|------------------------------|

## References in relation to European Directives

|                       |                |
|-----------------------|----------------|
| Water body ref.       | FRDR251        |
| Natura 2000 site ref. | Not applicable |



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A meander refilled with water. A submersible weir [1] is placed at the intersection of the straight channel [2] and the meander [3] to be refilled with water (2001).

### Opportunities to act

In response to this situation, in 1996, the Fédération départementale pour la pêche (Departmental Fishing Federation), in collaboration with the Conseil supérieur de la pêche (formerly Onema) and the local fishing association, initiated a Plan départemental pour la protection du milieu aquatique et la gestion des ressources piscicoles (PDPG - Département-level Plan for the Protection of the Aquatic Environment and the Management of Fish Resources). Its aim was the free movement of salmonids and the rediversification of habitats. The restoration measures formed part of the implementation of this plan.

### Works and developments

Thirteen meanders were restored in 1999, 2000 and 2001. The disconnected meanders had not been filled in and instead had been left uncultivated; most of them thus remained identifiable. The first stage consisted of restoring access to the meanders by removing the poplars planted during the resizing

of the river. Next, the current was diverted towards the old meanders which remained visible. The entrance to the straight channel was blocked using a submersible weir. The weirs consisted of timber billets covered with gravels, geotextile and protective mesh. The downstream part of the straight section was not closed off in order to allow for the dispersal of floodwaters. In areas in which the meanders were not identified, various experimental habitat diversification developments were carried out and weirs were removed or modified.

### Regulatory approach

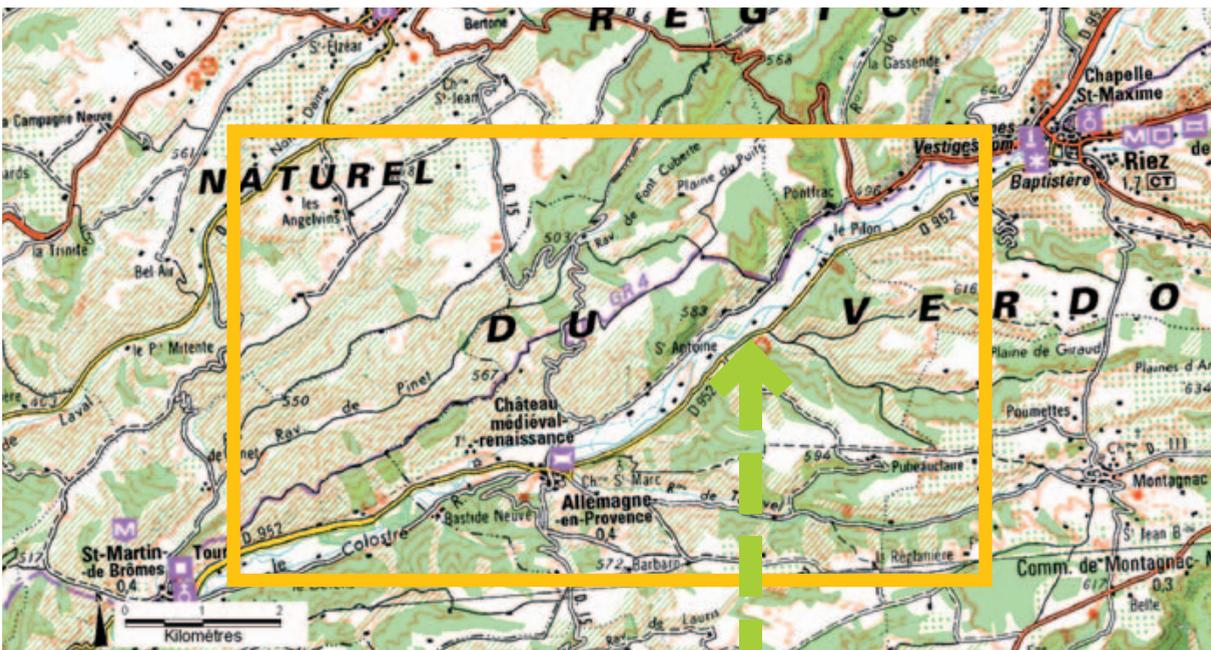
- “Dossier d’autorisation” consent according to the French Water Act.
- Agreement with the owners and acquisition of the fishing rights: under the terms of its statutes, the departmental fishing federation could not issue a declaration of public interest. Therefore, it had to list all of the owners and demand their written permission.

### Post-restoration management

Riverside vegetation, deadwood and vegetation on the submersible weirs and in the channels are maintained in order to allow floodwaters to follow the straight channel. The Conseil Général (Département-level Council) carries out this maintenance.

### Monitoring

Electric fishing operations were carried out in 1999 for the purpose of pre-works monitoring, prior to the start of works. Thereafter, three electric fishing operations were conducted in 2000, 2001 and 2002. Since then, there has been no monitoring and none is planned in the years to come.



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### ■ Outcome of the project and outlook

Despite the lack of quantified evaluation on the site, the benefits are significant.

The river is developing favourably, with a transition from uniform flow patterns towards alternating pools, runs and riffles. The increased amount of cover under the riverbank is also significant. Numerous helophytes have appeared and the beaver's presence contributes to the diversification of the environment.

Between 1999 and 2001, the techniques used for the creation of weirs improved and their angle was also improved in order to increase their effects. Opening the angle of orientation to 45° improved the flood resistance. During the first years, certain developments had to be consolidated following flooding but this is no longer the case today.

The profile of the straight sectors has not evolved and they are dry for most of the time.

The project remains a success. The modifications can be reversed because since the straightening of the stream, the uses adjacent to the river have barely changed.

In the framework of the River Verdon contract signed in 2000, eleven weirs situated on the Colostre must



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One of the Colostre meanders (2009)

be improved in order to facilitate crossing by 2012. Three have already been completed.

### ■ Promotion of the project

During the execution of the works, public meetings were held in each commune (town or village) affected by the project. Articles appeared in the local press and in the Verdon Regional Natural Park. This project allowed the departmental fishing federation to win the fishery trophy.



### ■ Costs

|                                     |                               |                |
|-------------------------------------|-------------------------------|----------------|
| Cost of studies                     | In euros excl. VAT            | Not determined |
| Cost of acquisitions                |                               | Not applicable |
| Cost of operations and developments |                               | €65,830        |
|                                     | <i>i.e. per linear metre:</i> | €6             |
| Cost of promotion                   |                               | Not applicable |
| <b>Total cost of the actions</b>    |                               | <b>€65,830</b> |

#### Financial partners and funding:

*Water Agency: 35%, Regional Council: 30%, Département-level council: 15%, Higher Fishing Council: 14%, local fishing association: 6%.*

#### Technical partner of the project:

*Conseil supérieur de la pêche - Departmental brigade.*



Malavoi J. (2006). *Retour d'expérience d'opérations de restauration de cours d'eau et de leurs annexes, menées sur le bassin RMC: 133..*

#### Project owner



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