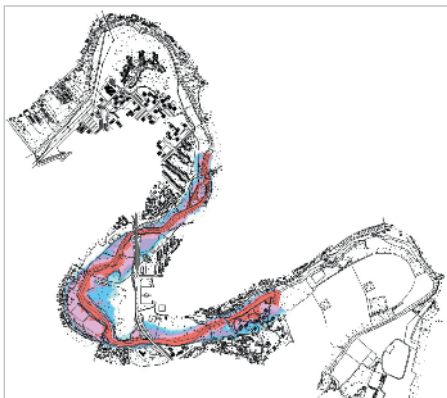


Rainwater and flood risk management



Rainwater treatment and flood risk management are major national and regional planning concerns because of increasing urbanisation and vulnerability of economic activities.

GINGER Environnement & Infrastructures has been involved in most of the exceptional events having taken place in France over the last few years, such as those in Vaison la Romaine, Nîmes, Aude, Somme, Gard, etc. As a result, it has acquired direct field experience to complement the mathematical, hydraulic, computing and hydrogeomorphological skills.



KNOW-HOW

The multi-disciplinary teams from GINGER Environnement & Infrastructures have developed a global approach to the understanding of rainwater precipitation, run-off and drainage phenomena and can provide solutions to control the risk of flooding while maintaining the physical and biological functionalities of waterways.

Their skills combine engineering studies and a naturalist approach by:

- Statistical analysing rainfall,
- One or two dimensional modelling of free surface flows in either static or transient flow mode,
- Modelling closed conduit flows in meshed networks,
- Hydro-geomorphological analysis of the alluvial plain.

The teams have acquired a high level of expertise in the spatial analysis of rainwater by processing radar images, using numerical terrain models, modelling hydraulic distribution and building hydraulic databases using GIS. The GINGER Environnement & Infrastructures hydrology and hydraulics engineers design specialised technical software packages such as Hydrokit, Ophyca and Alphée that are used by a large number of public bodies and engineering offices. These ensure that GINGER Environnement & Infrastructures is to be found in all the top French companies helping to assess the risk of flooding, its management and economic fallout.

OUR MISSIONS

• Rainwater treatment

- Rainwater treatment master plans for local authorities,

- Diagnosis of rainwater treatment networks,
- Technical design of projects modifying rainwater runoff conditions (comprehensive planning zones : designated development areas, development programs, airports, etc).

• Design, sizing and project management of hydraulic works and systems

- Urban and road rainwater treatment networks,
- Retention ponds, drainage trenches, roadway reservoirs, infiltration wells,
- Bridges, dykes, weirs, dams, and hillside reservoirs,
- Fish passes.

• Flood risk management

- Risk calculation and mapping (height, speed, submersion time) for floodable areas using mathematical modelling or hydro-geomorphological analysis, depending on the nature of the projects and available data,



- Terrain vulnerability and risk mapping (supported by geographical and hydraulic database management system),
- Setting up Flood Risk Prevention Plans (FRPP, synthetic municipal dossiers, municipal major risk information document),
- Comparative economic and environmental analyses of possible flood protection layouts (dams, dykes, etc) or for flood prevention (hillside reservoirs, reforestation, etc),
- Installation of flood warning systems by weather forecasting or hydrometric data transmission,
- Introduction of real-time flood forecasting models.



REFERENCES

Rainwater treatment: diagnostic and works programme

Rainwater treatment master plans: over fifty projects executed for local authorities with 500 to one million inhabitants, including Cherbourg, Castelnaudary, Blagnac, Montbrison, Frontignan, Le Mans and Marseille with modelling of the town centre rainwater network carried out for the Commission of the European Communities, the Greater Avignon Intermunicipal Authority, Pont Saint Esprit, Saverne, etc.

Several dozen **technical projects** undertaken each year for public or private development companies - Several dozen kilometres of road and motorways treated every year for rainwater treatment and sizing crossing structures.

Design, sizing and project management

Project management for works providing flood protection in a number of municipalities every year (Bollène, Labastide Rouairoux, Mazamet, etc.).

Over fifty fish passes constructed in the rivers Canche, Ternoise, Loire, Vesdre and Gueule in southern Belgium, Seine, Durance, etc.

Flood risk management

Over 300 **flood risk areas and water project studies** have been carried out for the transformation of catchment areas. These range from several square kilometres to regional scales covering several thousand square kilometres. They include the rivers Seine, Marne and Oise in the Ile-de-France region for the Grands Lacs of the Seine; hydrogeomorphological mapping of floodable areas in Sidi Bel Abbès in Algeria as well as for the greater Marseille region, the rivers Meuse and Aude and their principal tributaries, the river Seille in Moselle, the main waterways in New Caledonia, the limitation of the Cinq Centennale flood risk area on the Loire Moyenne for the Plan Loire Grandeur Nature, etc.

Several dozen **Flood Risk Prevention Plans** throughout France, on the rivers Seine, Oise, Touques, Têt, the Gardons in Alès, Aygues, Luech, Vernazobre, etc.

Completion of 120 synthetic municipal dossiers for the Loiret region local government.



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