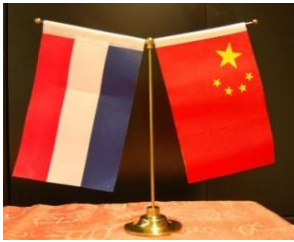


# The Dutch integrated Disaster Risk Management System



Applications with Special Reference to Flood and Industrial Hazards

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## The Netherlands



The **Netherlands** is a constituent country of the Kingdom of the Netherlands, located in North-West Europe. It is a parliamentary democratic constitutional monarchy. The Netherlands borders the North Sea to the north and west, Belgium to the south, and Germany to the east. The capital is Amsterdam (765.000 inhabitants) and the seat of government is The Hague.

The Netherlands in its entirety is often referred to as **Holland**. The word *Dutch* is used to refer to the people, the language, and anything pertaining to the Netherlands.

The Netherlands was one of the first parliamentary democracies. Among other affiliations the country is a founding member of the European Union (EU), NATO, OECD and WTO.

The Netherlands is a geographically low-lying country, with about 20% of its area and 21% of its population located below sea level, with 50% of its land lying less than one meter above sea level. Significant land area has been gained through land reclamation and preserved through an elaborate system of polders and dikes. Most of the country is very flat, with the exception of foothills in the far southeast and several low-hill ranges in the central parts.

### Queen Beatrix



**Beatrix** (Beatrix Wilhelmina Armgard; born 31 January 1938) is the queen regnant of the Kingdom of the Netherlands comprising the Netherlands, Netherlands Antilles, and Aruba. She is the first daughter of Queen Juliana of the Netherlands and Prince Bernhard of Lippe-Biesterfeld. She studied law at Leiden University. In 1966, she married Claus von Amsberg, with whom she had three children: Prince Willem-Alexander (born 1967), Prince Friso (born 1968), and Prince Constantijn (born 1969). When her mother Juliana abdicated on 30 April 1980, Beatrix succeeded her as Queen of the Netherlands. She was widowed in 2002.

**Willem-Alexander, Prince of Orange** (Willem-Alexander Claus George Ferdinand; born 27 April 1967) is the eldest child of Queen Beatrix of the Netherlands and Prince Claus. Since 1980, he has been heir apparent to the throne of the Kingdom of the Netherlands. He was in military service and he studied history at Leiden University. He is currently interested in international water management issues and sports. He married Princess Máxima in 2002. They have three daughters Princess Catharina-Amalia (born 2003), Princess Alexia (born 2005), and Princess Ariane (born 2007).

### Demographics



The Netherlands has an estimated population of about 16,500,000 (2010). It is the 11th most populous country in Europe and the 61st most populous country in the world. The fertility rate in the Netherlands is 1.66 children per woman (as of 2008), which is high compared to many other European countries, but well below the 2.1-rate required for natural population replacement. Life expectancy is high in the Netherlands: 82 years for newborn girls and 77 for boys (2007). The country has a migration rate of 2.55 migrants per 1,000 inhabitants.

The majority of the population of the Netherlands are ethnically Dutch. A 2005 estimate counted: 80.9% Dutch, 2.4% Indonesian (Indo-Dutch, South Moluccan), 2.4% German, 2.2% Turkish, 2.0% Surinamese, 1.9% Moroccan, 0.8% Antillean and Aruban, and 6.0% others. The Dutch

people are among the tallest in the world, with an average height of about 1.81 m (5 ft 11 in) for adult males and 1.68 m (5 ft 6 in) for adult females. People in the south are on average about 2 cm shorter than those in the north.

The Netherlands is the 25th most densely populated country in the world, with 395 inhabitants per square kilometre (1,023 sq mi)—or 484 people per square kilometre (1,254/sq mi) if only the land area is counted. It is the most densely populated country in Europe with a population over 16 million. The Randstad is the country's largest conurbation located in the west of the country and contains the four largest cities: Amsterdam in the province North Holland, Rotterdam and The Hague in the

province South Holland, and Utrecht in the province Utrecht. The Randstad has a population of 7 million inhabitants and is the 6th largest metropolitan area in Europe.

Dutch people, or descendants of Dutch people, are also found in migrant communities worldwide, notably in Canada, Australia, South Africa and the United States. According to the 2006 U.S. Census, more than 5 million Americans claim total or partial Dutch ancestry. There are close to 3 million Dutch-descended Afrikaners living in South Africa. In 1940, there were 290,000 Europeans and Eurasians in Indonesia, but most have since left the country.

### Zeeland



Also called **Zealand** in English and Zeelandic, is a province of the Netherlands. The province, located in the south-west of the country, consists of a number of islands (hence its name, meaning "sea-land") and a strip bordering Belgium. Its capital is Middelburg. With



a population of about 400,000. its area is about 2930 km<sup>2</sup>, of which almost 1140 km<sup>2</sup> is water. Large parts of Zeeland are below sea level. The last great flooding of the area was in 1953. Tourism is an important economic activity. It's sunny beaches make it a popular holiday destination in the summer. Most tourists are Germans. In some areas, the population can be two to four times higher during high summer season. The coat of arms of Zeeland shows a lion half-emerged from water, and the text "luctor et emergo" (Latin for "I struggle and I emerge").

### Emergency management

**Emergency management** (or **disaster management**) is the discipline of dealing with and avoiding risks. It is a discipline that involves preparing for disaster before it occurs, disaster response (e.g., emergency evacuation, quarantine, mass decontamination, etc.), and supporting, and rebuilding society after natural or human-made disasters have occurred. In general, any Emergency management is the continuous process by which all individuals, groups, and communities manage hazards in an effort to avoid or ameliorate the impact of disasters resulting from the hazards. Actions taken depend in part on perceptions of risk of those exposed. Effective emergency management relies on thorough integration of emergency plans at all levels of government and non-government involvement. Activities at each level (individual, group, community) affect the other levels. It is common to place the responsibility for governmental emergency management with the institutions for civil defense or within the conventional structure of the emergency services. However, emergency management actually starts at the lowest level and only increases to the next higher organizational level after the current levels resources have been exhausted. In the private sector, emergency management is sometimes referred to as business continuity planning. Emergency Management is one of a number of terms which, since the end of the Cold War, have largely replaced *Civil defense*, whose original focus was protecting civilians from military attack. Modern thinking focuses on a more general intent to protect the civilian population in times of peace as well as in times of war. Another current term, *Civil Protection* is widely used within the European Union and refers to government-approved systems and resources whose task is to protect the civilian population, primarily in the event of natural and human-made disasters. Within EU countries the term Crisis Management emphasizes the political and security dimension rather than measures to satisfy the immediate needs of the civilian population. An academic trend is towards using the term disaster risk reduction, particularly for emergency management in a development management context. This focuses on the mitigation and preparedness aspects of the emergency cycle (safety chain; proaction, prevention, preparation, response and recovery).

In the Netherlands the Ministry of the Interior and Kingdom Relations is responsible for emergency preparedness en emergency management on national level and operates a national crisis centre (NCC). The country is divided in 25 **safety regions** (veiligheidsregio). Each safety region is covered by three services: police, fire and ambulance. All regions operate according to the Coordinated Regional

Incident Management system. Other services such as the Ministry of Defence, waterboard(s), Rijkswaterstaat etc. can have an active role in the emergency management process.

### **Coordinated Regional Incident-Management Procedure**

The **Coordinated Regional Incident-Management Procedure** or **Gecoördineerde Regionale Incidentbestrijdings Procedure** (GRIP) is a nationwide emergency management procedure in the Netherlands. The procedure is used by all emergency services, different layers of government and government agencies.

The nationwide digital communication system C2000 is used for communications between the various emergency services and the policy teams and coordination centers.

### **Stages**

The procedure is scaled according to the affected area of an incident. There are four stages with an unofficial Stage 0 for normal day-to-day operations during small incidents.

### **Phase Affected area**

- GRIP 0 Source-suppression. Day-to-day routine operations, no special coordination necessary.
- GRIP 1 Source-suppression. Incident of limited proportions, harmonisation necessary between the various emergency services.
- GRIP 2 Source- and effect suppression. Incident with a definite effect on the surrounding area.
- GRIP 3 Threatened well-being of (large groups of) the population within a single municipality.
- GRIP 4 More than one municipality, province or country.

### **GRIP 1**

Due to the nature of the incident several emergency services are needed (fire, Emergency medical services, police) and their deployment needs coordination. A coordination team consisting of duty officers of the involved services is set up; there is no single commander.

### **GRIP 2**

A single command is established. This team is housed at a central location in the region and consists of managers of the involved services. The mayor of the affected municipality is informed; he will order (part of) the municipal policy team to convene. Since the mayor is the commander in chief in civilian emergencies his policy team will advise him on further actions such as evacuations.

### **GRIP 3**

A large area is affected. The mayor will order his full policy team and the municipal disaster management team to convene. The regional operational team will also convene in full composition. A mayor of one of the municipalities in the region is appointed as coordinating mayor; this is usually the mayor of the largest city in the region. This person chairs the regional policy team which further consists of chiefs of the emergency services and other advisors. The Queen's Commissioner is informed, who in turn informs the Minister of the Interior.

The incident can formally be classified as a disaster, although GRIP 3 can also be used in case of an impending disaster.

### **GRIP 4**

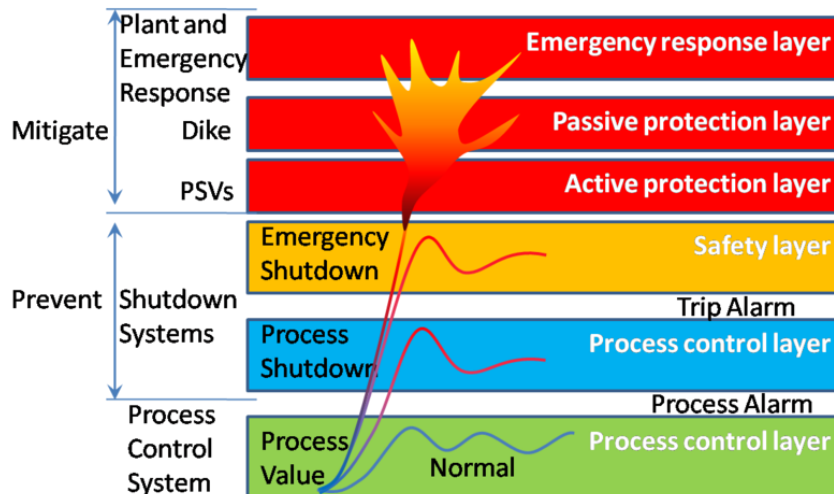
The effects of the disaster affect more than one municipality or even more than one province or country. The Queen's Commissioner orders the Provincial Coordination Center (PCC) into action. The mayors of the affected municipalities still function as commanders in chief in their own areas, but the commissioner has the power to give mayors orders. The commissioner has a coordinating role as long as the incident's effects do not affect other provinces. If other provinces are affected the

Minister of the Interior assumes the coordinating role; he has the power to give the Queen's commissioners orders. The minister will make use of the National Coordination Centre (NCC), which is continuously staffed. The NCC functions as an international point of contact when other nations are involved, either as affected areas or when providing assistance.

**Hazardous Material procedure ( Method)**

For the most part, these methods consist of the following elements, performed, more or less, in the following order.

1. identify, characterize, and assess threats
2. assess the vulnerability of critical assets to specific threats
3. determine the risk (i.e. the expected consequences of specific types of attacks on specific assets)
4. identify ways to reduce those risks
5. prioritize risk reduction measures based on a strategy



**Floods**

*Flood control in the Netherlands, Floods in the Netherlands, and Storm tides of the North Sea*



The areas of the Netherlands that are above sea level

Over the centuries, the Dutch coastline has changed considerably as a result of human intervention and natural disasters. Most notable in terms of land loss is the 1134 storm, which created the archipelago of Zeeland in the southwest.

On 14 December 1287, St. Lucia's flood affected the Netherlands and Germany killing more than 50,000 people in one of the most destructive floods in recorded history. The St. Elizabeth flood of 1421 and the mismanagement in its aftermath destroyed a newly reclaimed polder, replacing it with

the 72-square-kilometre (28 sq mi) *Biesbosch* tidal floodplains in the south-centre. The last major flood in the Netherlands took place in early February 1953, when a huge storm caused the collapse of several dikes in the southwest (Zeeland) of the Netherlands. More than 1,800 people drowned in the ensuing inundations. The Dutch government subsequently decided on a large-scale program of public works (the "Delta Works") to protect the country against future flooding. The project took more than thirty years to complete.

The disasters were partially increased in severity through human influence. People had drained relatively high lying swampland to use it as farmland. This drainage caused the fertile peat to compress and the ground level to drop, whereby they would lower the water level to compensate for the drop in ground level, causing the underlying peat to compress even more. The problem remains unsolvable to this day. Also, up until the 19th century peat was mined, dried, and used for fuel, further adding to the problem.

To guard against floods, a series of defenses against the water were contrived. In the first millennium AD, villages and farmhouses were built on man-made hills called *terps*. Later, these *terps* were connected by dikes. In the 12th century, local government agencies called "*waterschappen*" (English "water bodies") or "*hoogheemraadschappen*" ("high home councils") started to appear, whose job it was to maintain the water level and to protect a region from floods. (These agencies exist to this day, performing the same function.) As the ground level dropped, the dikes by necessity grew and merged into an integrated system. By the 13th century, windmills had come into use in order to pump water out of areas below sea level. The windmills were later used to drain lakes, creating the famous *polders*.

In 1932, the *Afsluitdijk* (English "Closure Dike") was completed, blocking the former *Zuiderzee* (Southern Sea) from the North Sea and thus creating the IJsselmeer (IJssel Lake). It became part of the larger Zuiderzee Works in which four polders totalling 2,500 square kilometres (965 sq mi) were reclaimed from the sea.

### Delta works



After the 1953 disaster, the Delta project, a vast construction effort designed to end the threat from the sea once and for all, was launched in 1958 and largely completed in 1997 with the completion of the Maeslantkering. The official goal of the Delta project was to reduce the risk of flooding in South Holland and Zeeland to once per 10,000 years. (For the rest of the country, the protection level is once per 4,000 years.) This was achieved by raising 3,000 kilometers (1,864 mi) of outer sea-dykes and 10,000 kilometers (6,214 mi) of inner, canal, and river dikes to "delta" height, and by closing off the sea estuaries of the

Zeeland province. New risk assessments occasionally show problems requiring additional Delta project dyke reinforcements. The Delta project is one of the largest construction efforts in human history and is considered by the American Society of Civil Engineers as one of the seven wonders of the modern world.

Additionally, the Netherlands is one of the countries that may suffer most from climatic change. Not only is the rising sea a problem, but also erratic weather patterns may cause the rivers to overflow. The Delta Works are located in the provinces of South Holland and Zeeland.

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Thanks to: <http://en.wikipedia.org>