Envisioning the future of transboundary river basins

with case-studies from the Scheldt river basin

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April 2002

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Acknowledgements

This report on future studies for transboundary river management builds on the experiences of the international, interuniversity RIVER21 project in 2000 and 2001. We describe the method that we have used when we worked with our French, Belgian and Dutch collegues and students on vision-building for the Scheldt river basin. We also give a summary of the results of vision-building in a university-setting (Chapter 3 and 4). For these two chapters especially we acknowledge our RIVER21 collegues with whom we have cooperated on the design and implementation of the RIVER21 project. The remaining chapters have been written in response to questions by Rijkswaterstaat Zeeland on the issue of future studies, cooperation and communication within river basins and river basin commissions.

We owe very much to the inspiration, cooperation and friendship, so generously given by Gabrielle Bouleau, from ENGREF, Montpellier (France), Patrick Meire, Monique Sys and Marleen Coenen, from the Instituut voor Milieukunde, Universitaire Instelling Antwerpen (Belgium), and to Mark Huygens and Ronnie Verhoeven, Laboratorium voor Hydraulica, Universiteit van Gent (also Belgium). Wil Thissen and Bert Enserink, Faculty of Policy Technology and Management, Delft University of Technology, have given valuable comments on the chapters regarding scenario development and the RIVER21 methodology. The support of Piet Warmerdam, Peter Troch and Jan Leentvaar, Subdepartment of Water Resources Management, Wageningen University & Research, are kindly acknowledged.

Educational projects like RIVER21 can only grow and improve when the people involved in transboundary river management show critical interest and support. We want to thank Leo Santbergen and Ammo Hoekstra (RWS Zeeland) and Bert van Eck (RIKZ) for their enthusiastic and critical enquiries into the objectives and results of RIVER21.

This report is written in English to be able to disseminate the RIVER21 experience outside the Scheldt river basin. We have added extensive summaries in Dutch and French, the official languages of the formal networks in the Scheldt basin.

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The past can only be described, but we can write the future together.
Frederico Mayor, voormalig Ondersecretaris-generaal
en Directeur-generaal van UNESCO

Samenvatting

Het belang van visievorming voor de toekomst van grensoverschrijdende riviersystemen in Europa, met illustraties van visievorming voor het Scheldestroomgebied

1. Inleiding

Het 2e Wereld Water Forum (Den Haag, 2000) heeft veel aandacht gegeven aan het belang van (strategische) visievorming en het formuleren van gezamenlijke doelen voor het actiegericht plannen van duurzaam waterbeheer. Het maken van een visie voor waterbeheer, zoals voorgesteld door de World Water Council, berust op systematische methoden om de toekomst te verkennen. Ook de Europese Kaderrichtlijn Water spreekt over het bevorderen van duurzaam gebruik van water en het beschermen en verbeteren van de kwaliteit van aquatische ecosystemen en de daarmee samenhangende terrestrische ecosystemen en waterrijke gebieden. Het beheer van grensoverschrijdende riviersystemen kan volgens die richtlijn het beste worden gecoördineerd door internationale riviercommissies waarbij overheden het voortouw nemen en daarbij gebruikers, belangenorganisaties en burgers actief betrekken (artikel 14, participatie en voorlichting van het publiek).

2. Methoden voor het verkennen van de toekomst

Dit rapport geeft een overzicht van een aantal (actuele) **methoden voor het verkennen van de toekomst** (hoofdstuk 2). Drie voorbeelden van scenario-ontwikkeling worden besproken met de nadruk op het doel van de scenario's, de methode die gebruikt is en de belangrijkste resultaten. De scenario's zijn gemaakt voor Shell Oil Companies (*Global Scenarios*), Zuid-Afrika ten tijde van het opheffen van de apartheid (*Mont Fleur Scenarios*) en de Europese Commissie (*Europe 2010 Scenarios*). Tevens wordt de Search Conference methode toegelicht; deze methode is geschikt voor het interactief ontwikkelen van maatregelen op lokaal niveau en vanuit een gezamenlijk toekomstperspectief. Het gepresenteerde literatuuroverzicht laat zien dat er verschillende methoden bestaan. Voor het ontwikkelen van de 'Europe 2010' scenario's werden methoden de Franse en Angelsaksische denkscholen gecombineerd. Voor een succesvolle samenwerking binnen Europese stroomgebieden is het belangrijk op zoek te gaan naar effectieve combinaties van de elementen uit die verschillende methoden. Participanten in visieontwikkeling moeten kunnen omgaan met verschillen in methoden die gangbaar zijn in verschillende landen.

3. Visieontwikkeling en de RIVER 21 methode

Het belang van visievorming, zoals gedemonstreerd tijdens het Wereld Water Forum in 2000, en de uitdaging van de Europese Kaderrichtlijn Water om tot gezamenlijke, grensoverschrijdende planvorming te komen, waren aanleiding voor vijf Franse, Belgische en Nederlandse universiteiten om in 2000 en 2001 met studenten een visie te ontwikkelen voor het Scheldestroomgebied als onderdeel van het **RIVER21** project. De methode voor visieontwikkeling is samengesteld uit methoden voor participatieve probleemdefiniëring, systeemanalyse, en de Angelsaksische methoden voor scenario-ontwikkeling. Deze methode is uitgetest door twee groepen van 25 studenten. De methode wordt uitgebreid beschreven in hoofdstuk 3.

De studenten werkten in internationale en interuniversitaire groepen. De verschillen tussen de studenten betroffen verschil in kennis/discipline, in attitude t.o.v. waterbeheer, in (type) vaardigheden en verwachtingen m.b.t. groepswerk, in Engelse taalvaardigheid en in culturele achtergrond. De docenten stelden vast dat het een grote uitdaging was voor de studenten om een gezamenlijke vocabulaire te ontwikkelen, om gelijkluidende definities te hanteren, om effectief te discussiëren en tot consensus te komen onder hoge tijdsdruk. Toch zijn juist deze vaardigheden belangrijk voor het succes van RIVER21, omdat het karakter van de gebruikte methoden veel nadruk legt op elementen zoals brainstorming, consensusvorming, creatieve werksessies en vrije denkprocessen. De nadruk op de Angelsaksische methoden was een extra uitdaging voor de Franse studenten omdat zij ook kennis hadden van de Franse methoden van visieontwikkeling.

Essentiële onderdelen van de RIVER 21 methode zijn:

- Studenten en docenten komen twee weken samen om te reizen door het stroomgebied ('van bron tot monding') en vervolgens een gezamenlijke visie te ontwikkelen door middel van discussies en groepswerk;
- De deelnemers verkennen de problemen van de verschillende landen/regio's en verbinden deze met elkaar middels oorzaak-en-gevolg analyses;
- De deelnemers beschrijven een wenselijke toekomst voor het stroomgebied en formuleren gezamenlijk doelen voor het te voeren waterbeheer om die toekomst te kunnen bereiken en problemen op het vlak van ecologie, economie en maatschappij te voorkomen of op te lossen;
- De visie wordt gepresenteerd aan belanghebbenden in de vorm van gesproken en geschreven verhalen, kaarten en ander beeldend materiaal.

4. Ervaringen en analyses van studenten: het Schelde stroomgebied

De ervaringen en analyse van de studenten zijn beschreven in hoofdstuk 4.

Volgens de studenten zijn de belangrijkste r**esultaten** van een visie-ontwikkelingsproces:

- Het ontwikkelen van een gezamenlijk idioom ('waar praten we over?' en 'welke begrippen hanteren we?');

- Het gezamenlijk (h)erkennen van de verschillende belangen in een stroomgebied;
- Het stellen van gezamenlijke doelen;
- Het uitvoeren van een gestructureerde systeemanalyse;
- Leren samenwerken vanuit verschillende culturen en met respect voor verschillende achtergronden en manieren om problemen aan te pakken;
- Het kunnen communiceren van een visie op de toekomst met alle betrokkenen: politici, bestuurders en burgers.

Binnen het RIVER 21 project hebben de studenten in 2000 en 2001 een visie ontwikkeld voor het grensoverschrijdende Schelde stroomgebied. De inzichten van de studenten op basis van de **probleemanalyse** kunnen als volgt samengevat worden:

- Bovenstrooms in Frankrijk zijn de slechte waterkwaliteit, door industriële lozingen en diffuse verontreiniging vanuit de landbouw, en de overbenutting van het grondwater belangrijke problemen. De economische ontwikkeling is door de recente sluiting van de mijnen nog problematisch. Water transfers van naastliggende stroomgebieden zijn een realiteit en vereisen grensoverschrijdende samenwerking met Wallonië en Vlaanderen;
- In het Vlaamse deel van het stroomgebied worden erosie en sedimentatie problemen aangegeven en het verlies van ecologische diversiteit. Benedenstrooms van Gent is de waterkwaliteit slecht door het toestromen van ongezuiverd rioolwater vanuit Brussel. Tevens is in dit gedeelte van het stroomgebied de kans op overstromingen toegenomen als gevolg van ingrepen in het watersysteem, zoals verruiming van de vaarweg, bedijking en inpoldering;
- Het estuarium is zowel uit ecologisch als economisch oogpunt zeer belangrijk voor Nederland en Vlaanderen. Verdieping van de vaargeul in de Westerschelde om zo grotere zeeschepen in de haven van Antwerpen te kunnen ontvangen, heeft een verstoring van het unieke ecologische systeem tot gevolg. Vlaanderen hecht echter belang aan een verdieping. Nederland hecht belang aan een zo natuurlijk mogelijk estuarium en een vlotte maar vooral ook veilige vaarweg.

In de **toekomstvisie van de studenten** is specialisatie en samenwerking gewenst van de verschillende binnenlandse- en zeehavens (van Le Havre tot Hamburg) om de consequenties van die activiteiten op andere functies (ecologie en veiligheid voor inwoners) in het stroomgebied binnen acceptabele grenzen te houden. Internationale en Europese afspraken ter beperking van de grootte van de schepen is hiervoor een vereiste. Een functionele differentiatie van de rivier, zijrivieren en kanalen wordt aanbevolen om de transport functie en de ecologische functies (inclusief drinkwaterfunctie) te garanderen. Het riviersysteem zou geschikt moeten zijn voor migratie van organismen. De waterschaarste die vooral in de zomer optreedt, zou aangepakt moeten worden via een terugdringen van de vraag en het bevorderen van de infiltratie. Op de lange termijn is het stroomgebied dan niet meer afhankelijk van water transfers.

Ruimtelijke planvorming, met het functioneren van het watersysteem als uitgangspunt, vormt een belangrijk instrument. Meer ruimte voor het bergen van water moet worden gevonden om toegerust te zijn voor de optredende zeespiegelrijzing en veranderingen vanwege klimaat. De landbouwsector zou ingrijpend moeten veranderen tot een 'duurzame' sector: land wordt minder intensief gebruikt terwijl opbrengsten op peil blijven door technologische vernieuwing en emissies naar het milieu substantieel zijn teruggebracht. Een gezaghebbende internationale riviercommissie, met instrumenten als een eigen budget, is in staat grensoverschrijdende problemen op te lossen, door regionale autoriteiten, belangengroepen en vertegenwoordiging van de inwoners van het stroomgebied, bij haar werk te betrekken.

5. Visievorming en de implementatie van de Kaderrichtlijn Water

De implementatie van de **Europese Kaderrichtlijn Water** vereist het maken van een grensoverschrijdend stroomgebiedplan ten einde de in de Kaderrichtlijn gestelde doelen met de beste inzet van middelen te halen in een bepaalde tijd. Gezien de ambitieuze doelen vraagt dat een grote en gecoördineerde inzet van de kennis, middelen en ondersteuning van vele actoren. In ieder geval zouden de competente autoriteiten in de verschillende rivieroeverstaten vanaf het begin met elkaar moeten samenwerken om te voorkomen dat er te kleinschalig oplossingen worden gezocht en bepaalde boven- en benedenstroomse afhankelijkheden wel in beschouwing worden genomen. Een strategische dialoog tussen alle partijen is hiervoor een belangrijk middel.

6. Een strategische dialoog in rivierstroomgebieden

Gezamenlijke visievormingsprocessen zijn een wezenlijk onderdeel van een strategische conversatie. Ze dragen bij aan en het (h)erkennen van elkaars belangen en de totstandkoming van een gedeelde probleemanalyse, gevolgd door het selecteren van gezamenlijke lange termijn doelen waar geleidelijk aan naar toe wordt gewerkt. Landen en gewesten die samen nadenken over hun gezamenlijke toekomst, kunnen in staat zijn deze toekomst ook daadwerkelijk met elkaar te delen en te realiseren. Ze gaan op zoek naar (creatieve) manieren om tegenstellingen in de huidige aanpak van het waterbeheer op te lossen.

Hoewel de tijdhorizon van de Kaderrichtlijn beperkt is, heeft het zin om voorbereid te zijn op krachten die het klimaat, techniek en maatschappij in een stroomgebied ingrijpend kunnen veranderen. Het gezamenlijk verkennen van toekomstige kansen en bedreigingen vergroot de effectiviteit van een stroomgebiedplan ook voor de korte termijn. In andere woorden: het is belangrijk om een strategische dialoog te voeren: een gesprek dat gevoerd wordt tussen de beheerders van het rivierbassin over de mogelijke én wenselijke toekomsten van het rivierbassin, alvorens lange termijn plannen te ontwikkelen. Een strategische dialoog kan het continue leerproces binnen de netwerken van beheerders en andere belanghebbende partijen in het stroomgebied, bevorderen en instandhouden. Zonder een dergelijk leerproces zullen instituties voor samenwerking en coördinatie zich niet tijdig

genoeg kunnen aanpassen aan de snel veranderende wereld waarin de waterbeherende instanties effectief moeten zijn.
Kennis en vaardigheden in geïntegreerde planning, principes van stroomgebiedbeheer, *best management practices* en het omgaan met cultuurverschillen in het stroomgebied, is nodig voor effectieve deelname aan een strategische dialoog. Het scheppen van mogelijkheden dat betrokkenen, uit de diverse rivieroeverstaten, bij het implementeren van de Kaderichtlijn **gezamenlijk** worden getraind 'on the job', kan in deze behoefte voorzien.

7. Aanbevelingen voor samenwerking en communicatie

Aanbeveling 1: Betrek partijen op verschillende schaalniveaus in een stroomgebiednetwerk

Samenwerking, zo wordt beargumenteerd in dit rapport, is essentieel voor institutioneel leren en vanwege het bereiken van de consensus die noodzakelijk is voor de implementatie van een stroomgebiedplan. Deze samenwerking is alleréérst van belang op het hoogste niveau in het stroomgebiednetwerk waar de lidstaten samenwerken. Daarnaast moet de samenwerking gecompleteerd worden door gezamenlijke inspanningen en informatie-uitwisseling op andere schaalniveaus (rivierbekkens, regio's) en in gerelateerde netwerken (scheepvaart, ruimtelijke ordening, drinkwatervoorziening etc.). Inspanningen voor samenwerking en communicatie ten gunste van het integraal waterbeheer van het stroomgebied, moeten zich deswege richten op de volgende groepen:

- Het netwerk van waterbeheerders in het bovenstroomse, midstroomse en benedenstroomse deel van het Scheldebekken;
- Binnen een deelbekken de waterautoriteiten én andere overheidsdiensten die een taak hebben op het gebied van milieu, economische ontwikkeling en ruimtelijke ordening;
- Binnen een deelbekken het netwerk van deze autoriteiten én afvaardigingen van economische sectoren, NGO's en het publiek;
- Het netwerk van de riviercommissie met andere internationale organisaties die de economische, milieu en sociale belangen behartigen (zoals andere riviercommissies, industriële en maritieme transport associaties en World Wildlife Fund).

Het opbouwen en onderhouden van dit netwerk, dat dus bestaat uit horizontale en verticale relaties, vraagt erom dat afvaardigingen elkaar regelmatig ontmoeten en ideeën kunnen uitwisselen. Betrokken partijen bij het netwerk, kunnen weer hun achterban mobiliseren bij de uitvoering van het waterbeheer. Het aanbieden van mogelijkheden voor opleiding en training en toegang tot professionele netwerken, is een effectief middel voor het vergroten van de betrokkenheid bij het stroomgebiednetwerk en draagt dus bij aan de implementatie van de Kaderrichtlijn.

Aanbeveling 2: Start met visie- en scenario ontwikkeling op de schaal van het hele stroomgebied, in informele netwerken

Een andere, meer informele manier van werken stimuleert de onderlinge communicatie en geeft gelegenheid tot het delen van zorgen en ideeën.

Tezamen met belangrijke partners, kan een plan van aanpak worden gemaakt voor het ontwikkelen van een stroomgebiedplan met gezamenlijke doelen, een maatregelen programma en een communicatiestrategie.

Vergroot zorgvuldig de invloedssfeer van de riviercommissie om gezamenlijke afhankelijkheden te bespreken zonder de realiteit te verliezen dat de lidstaten hun eigen territoriale verantwoordelijkheden hebben.

Een voorbeeld van zo'n informeel netwerk is het RIVER21 netwerk: universiteiten uit het stroomgebied werken samen en experimenteren met methoden voor toekomststudies. Een dergelijk netwerk betrokken worden bij (het vormen van) andere, zowel informele als formele, netwerken zoals bijvoorbeeld de Water en Economie (Wateco) groep, onderdeel van de Europese implementatiestrategie van de Kaderrichtlijn.

Aanbeveling 3: Inviteer experts om de strategische dialoog te ondersteunen en maak daarvoor gelden beschikbaar

Inviteer procesfacilitatoren, met een rijke ervaring op het gebied van beleidsontwikkeling en toekomststudies én met het vermogen om waterbeleid te verbinden met sociaal-maatschappelijke vraagstukken. Deze experts zijn te vinden in internationale bedrijven, consultancy bureaus, bestuursacademies en universiteiten die methoden voor strategische conversaties doceren. Het is aan te raden experts te vragen die kunnen werken met Franse, Angelsaksische en andere methoden die gangbaar zijn in Europa.

Aanbeveling 4: Verspreid breed informatie en kennis over het functioneren van het stroomgebied

Publieke participatie in besluitvorming, het bouwen aan consensus en institutioneel leren zijn belangrijk voor succesvol stroomgebiedbeheer. Een voorwaarde is echter dat er, voor het hele stroomgebied, een transparante informatievoorziening is, niet gehinderd door administratieve grenzen. Openbare toegang tot informatie is noodzakelijk om een creatieve, bassin-brede uitwisseling van ideeën tot stand te brengen, voor capaciteits-ontwikkeling en voor het evalueren van de voortgang. Toegang tot informatie werkt sterk mee tot het creëren van een waterbewustzijn in een rivierstroomgebied, zoals verwoordt in het begrip "Scheldegevoel."

Tenslotte: Een goede organisatie van het gezamenlijke planproces in een stroomgebied is de belangrijkste uitdaging van de Europese kaderrichtlijn Water. Wij zien een grote noodzaak voor het houden van **strategische gesprekken** over de toekomst van de organisaties in Europese stroomgebieden. Dergelijke gesprekken zijn een voorwaarde voor deze organisaties tot **institutioneel leren om zo effectief te kunnen coördineren**. Strategische dialogen kunnen een kader bieden voor de communicatie met het publiek en met publieke en private partners. Zij bieden het kader voor het doel van planning: het stellen van gezamenlijke lange termijn doelen die rekening houden met ecologische als economische factoren en met maatschappelijke krachten. Zonder een dergelijk kader kan aan de wettelijke verplichting van de kaderrichtlijn worden voldaan maar is duurzaam stroomgebiedbeheer onwaarschijnlijk voor de eerstvolgende en komende generaties.

The past can only be described, but we can write the future together.
Frederico Mayor, voormalig Ondersecretaris-generaal
en Directeur-generaal van UNESCO

Résumé français

L'intérêt de la conception d'une vision pour l'avenir des réseaux hydrographiques transfrontaliers en Europe, avec illustrations de la conceptualisation pour le bassin hydrographique de l'Escaut

1. Introduction

Le 2ème Forum mondial sur l'Eau (La Haye, 2000) s'est focalisé sur l'intérêt de la conception d'une vision (stratégique) et de la formulation d'objectifs communs pour la planification dynamique de la gestion durable de l'eau. L'élaboration d'une vision pour la gestion de l'eau, comme proposé par le World Water Council, repose sur des méthodes systématiques de prospection de l'avenir. La Directive cadre européenne sur l'eau aussi vise la promotion d'une utilisation durable de l'eau ainsi que de la préservation et de l'amélioration des écosystèmes aquatiques et des écosystèmes terrestres et zones humides qui en dépendent. Suivant la directive, la gestion des réseaux hydrographiques transfrontaliers peut être le mieux coordonnée par des commissions fluviales internationales, l'initiative revenant aux pouvoirs publics qui y associeront activement les utilisateurs, les groupes d'intérêt et les citoyens (article 14, participation et information du public).

2. Méthodes de prospection de l'avenir

Ce rapport présente un aperçu d'une série de **méthodes (actuelles) de prospection de l'avenir** (chapitre 2). Trois exemples de mise au point de scénarios sont discutés, l'accent étant mis sur l'objectif des scénarios, la méthode utilisée et les principaux résultats. Les scénarios ont été mis au point pour Shell Oil Companies (*Global Scenarios*), l'Afrique du Sud au temps de la suppression de l'apartheid (*Mont Fleur Scenarios*) et la Commission européenne (*Europe 2010 Scenarios*). La méthode Search Conference est également commentée; cette méthode convient pour le développement interactif de mesures au niveau local à partir d'une perspective d'avenir commune. L'aperçu des études de littérature montre que différentes méthodes existent. Les scénarios européens 2010 intègrent les méthodes de deux courants d'idées, les méthodes françaises et anglo-saxonnes. Une coopération fructueuse au sein des bassin hydrographiques européens implique la recherche de combinaisons efficaces d'éléments tirés de ces différentes méthodes. Ceux qui participent à l'élaboration d'une vision doivent donc également être familiarisés avec les différentes méthodes.

3. Conception d'une vision et la méthode RIVER 21

L'intérêt de l'élaboration d'une vision, comme démontré durant le Forum mondial de l'Eau 2000, et le défi de la Directive cadre européenne sur l'eau visant à l'élaboration commune d'un plan transfrontalier ont amené cinq universités françaises, belges et néerlandaises à concevoir en 2000 et 2001 avec leurs étudiants une vision pour le bassin hydrographique de l'Escaut dans le cadre du projet **RIVER21.** La méthode de conception de la vision se compose de méthodes de définition participative des problèmes, d'une analyse systémique et de méthodes anglo-saxonnes de mise au point de scénarios. Cette méthode a été testée par deux groupes de 25 étudiants. Elle est décrite en détails dans le chapitre 3.

Les étudiant ont travaillé dans des groupes internationaux et interuniversitaires. Ils se distinguaient par des différences au niveau de leurs connaissances/discipline, de leur attitude face à la gestion de l'eau, de leur (type) d'aptitudes et attentes pour ce qui est du travail en groupe, de leurs connaissances de la langue anglaise et de leur identité culturelle. Les professeurs ont constaté que le développement d'un vocabulaire commun, l'utilisation de définitions homogènes, le fait de discuter de façon efficace et arriver à un consensus sous une pression importante constituaient un grand défi pour les étudiants. Ce sont précisément ces aptitudes qui sont importantes pour le succès de RIVER21, parce que les méthodes utilisées mettent fortement l'accent sur des éléments tels que la réflexion, le consensus, les sessions de travail créatives et les processus de pensée libres. L'accent mis sur les méthode anglo-saxonnes a constitué un défi supplémentaire pour les étudiants français qui ne connaissaient que les méthodes françaises de conception de vision.

Parties essentielles de la méthode RIVER 21 :

- Les étudiants et les professeurs se réunissent pendant deux semaines pour visiter le bassin hydrographique (de la source à l'embouchure) et élaborer ensuite en commun une vision à travers des discussions et un travail de groupe;
- Les participants explorent les problèmes des différents pays/régions et relient ceux-ci au moyen d'analyses de cause à effet;
- Les participants décrivent un avenir souhaitable pour le bassin hydrographique et formulent en commun des objectifs pour la gestion de l'eau à assurer afin de résoudre les problèmes dans le domaine de l'écologie, de l'économie et au niveau de la société afin de pouvoir concrétiser cet avenir
- La vision est présentée aux intéressés sous la forme de commentaires oraux et écrits, de cartes et d'autres supports illustratifs.

4. Expériences et analyses des étudiants: le bassin hydrographique de l'Escaut

Les expériences et l'analyse des étudiants sont présentées au chapitre 4.

Suivant les étudiants, les principaux **résultats** d'un tel processus de conception d'une vision sont les suivants:

- La mise au point d'un idiome commun ('de quoi parlons-nous?' et 'quels concepts utilisons-nous?');
- La (re)connaissance commune des différents intérêts d'un bassin hydrographique;
- La fixation d'objectifs communs;
- La réalisation d'une analyse systémique structurée;
- Apprendre à coopérer au départ de différentes cultures dans le respect des différents antécédents et des méthodes d'approche des problèmes;
- Pouvoir communiquer à propos d'une vision de l'avenir avec tous les intéressés : responsables politiques, fonctionnaires et citoyens.

Dans le cadre du projet RIVER 21, les étudiants ont élaboré en 2000 et 2001 une vision pour le bassin hydrographique transfrontalier de l'Escaut. L'opinion des étudiants découlant de l'**analyse de la problématique** peut être résumée comme suit :

- A l'amont, en France, la mauvaise qualité de l'eau due aux rejets industriels et à la pollution diffuse provenant de l'agriculture, et la surexploitation des eaux souterraines constituent des problèmes importants. Le développement économique est encore difficile suite à la fermeture récente des mines. Les transferts d'eau des bassins voisins constituent une réalité et exigent une coopération transfrontalière avec la Wallonie et la Flandre ;
- Dans la partie flamande du bassin, l'érosion et les problèmes de sédimentation sont relevés ainsi que la perte de la diversité écologique. En aval de Gand, la qualité de l'eau est mauvaise à cause des apports d'eau non épurée provenant du réseau d'égouttage de Bruxelles. Dans cette partie du bassin, les risques d'inondation ont augmenté suite aux interventions dans le réseau hydrographique, telles que l'élargissement de la voie navigable, l'endiguement et la poldérisation;
- L'estuaire revêt un grand intérêt tant du point écologique qu'économique pour les Pays-Bas et la Flandre. L'approfondissement du chenal navigable dans l'Escaut occidental devant permettre d'accueillir des bateaux de plus gros gabarit dans le port d'Anvers perturbera le système écologique unique de cette zone. La Flandre tient réellement à cet approfondissement. Les Pays-Bas tiennent à préserver un estuaire le plus naturel possible et une voie navigable permettant une circulation fluide mais également en toute sécurité.

Suivant la **vision d'avenir des étudiants,** les différents port intérieurs et maritimes (du Havre à Hambourg) devraient se spécialiser et coopérer afin de maintenir dans des limites acceptables les conséquences de leurs activités

sur d'autres fonctions (écologie et sécurité des habitants) du bassin. Des accords internationaux et européens limitant le gabarit des bateaux s'imposent à cet effet. Une différenciation fonctionnelle entre le fleuve, les affluents et les canaux est recommandée afin de garantir la fonction de transport et les fonctions écologiques (y compris eau potable). Le réseau fluvial devrait permettre la migration des organismes. Le problème de la pénurie d'eau qui se manifeste surtout en été devrait être abordé par le biais d'une réduction de la demande et en facilitant l'infiltration. A long terme, le fleuve ne dépendra ainsi plus des transferts d'eau.

La planification spatiale basée sur le fonctionnement du réseau hydrographique constitue un instrument précieux. Il convient de trouver davantage d'espace pour stocker l'eau, afin d'être préparé à la montée du niveau de la mer et aux changements climatiques. Le secteur agricole devrait se transformer radicalement pour devenir un secteur "durable" : utilisation moins intensive des terres avec maintien du rendement grâce aux innovations technologiques et diminution substantielle des émissions dans l'environnement. Une commission fluviale internationale faisant autorité disposant d'instruments tels qu'un budget propre est à même de résoudre les problèmes transfrontaliers en associant à son travail les autorités régionales, les groupes d'intérêts et les représentants des habitants riverains du bassin.

5. Conception d'une vision et transposition de la Directive cadre Eau

La transposition de la **Directive cadre européenne sur l'eau** exige l'élaboration d'un plan de district international afin de réaliser en temps voulu les objectifs fixés par une mise en oeuvre efficace des moyens. Ces objectifs ambitieux exigent une mise en oeuvre coordonnée des connaissances, moyens et l'appui de nombreux acteurs. Les autorités compétentes des différents états riverains devraient coopérer en tout cas dès le début afin d'éviter de rechercher des solutions sur une échelle trop réduite et de négliger à tort certains intérêts subordonnés en aval ou en amont. Un dialogue stratégique entre toutes les parties constitue à cet effet un instrument précieux.

6. Un dialogue stratégique dans les bassins fluviaux

Des processus communs d'élaboration de vision constituent une partie essentielle d'un entretien stratégique. Ils contribuent à la (re)connaissance des intérêts mutuels et à la réalisation d'une analyse partagée des problèmes; cette analyse étant suivie de la sélection d'objectifs communs à long terme dont la réalisation est progressivement assurée. Les pays et les régions qui réfléchissent ensemble à leur avenir commun seront à même de partager et de réaliser effectivement cet avenir. Ils recherchent des méthodes (créatives) pour faire disparaître les antagonismes dans l'approche actuelle de la gestion de l'eau.

Bien que l'horizon temps de la Directive cadre soit limité, il est pertinent d'être préparé aux forces pouvant modifier de façon radicale le climat, les techniques et la société dans un bassin hydrographique. La prospection commune des opportunités et menaces futures renforce l'efficacité d'un plan

de bassin, également à court terme. En d'autres mots, il est important de mener un dialogue stratégique, à savoir une discussion entre les gestionnaires du bassin fluvial concernant l'avenir possible et souhaitable du bassin avant d'établir des plans à long terme. Un dialogue stratégique peut favoriser et préserver le processus d'apprentissage permanent au sein des réseaux des gestionnaires et des autres parties intéressées du bassin. En l'absence d'un tel processus d'apprentissage, les institutions de coopération et de coordination ne pourraient s'adapter en temps voulu aux rapides changements d'un monde dans lequel les instances de gestion de l'eau se doivent d'être efficaces.

Une participation efficace à un dialogue stratégique exige des connaissances et un savoir-faire dans le domaine de la planification intégrée, des principes de gestion de bassin, des meilleures pratiques de gestion et de l'approche des différences culturelles dans le bassin. Ce besoin peut être couvert par la création d'opportunités permettant aux intéressés des différents états riverains de se rôder **en commun** 'on the job' dans le cadre de la transposition de la Directive cadre.

7. Recommandations en matière de coopération et de communication

Recommandation 1: Associer les parties des différents niveaux d'échelle à un réseau de bassin

Selon l'argumentation du présent rapport, la coopération est essentielle pour l'apprentissage institutionnel et en raison du consensus indispensable pour la transposition d'un plan de bassin. Cette coopération s'impose en premier lieu au niveau le plus élevé du réseau de bassin dans lequel les états membres coopèrent. La coopération doit en plus être complétée par des efforts communs et des échanges d'informations à d'autres niveaux d'échelle (bassins de rivière, régions) et dans les réseaux sous-jacents (navigation, aménagement du territoire, etc.). Les efforts de coopération et de communication en faveur de la gestion intégrée de l'eau du bassin doivent par conséquent être orientés vers les groupes suivants :

- Le réseau des gestionnaires de l'eau de la partie amont, médiane et aval du bassin de l'Escaut ;
- Au sein d'un sous-bassin, les autorités gestionnaires de l'eau et autres services publics ayant une tâche à remplir dans le domaine de l'environnement, du développement économique et de l'aménagement du territoire;
- Au sein d'un sous-bassin, le réseau de ces autorités et les représentants des secteurs économiques, des ONG et du public ;
- Le réseau de la commission fluviale avec d'autres organisations internationales de défense des intérêts économiques, environnementaux et sociaux (comme d'autres commissions fluviales, associations de transport industriel et maritime et le World Wildlife Fund).

Créer et entretenir ce réseau qui est donc constitué de relations horizontales et verticales impliquent des rencontres et échanges de vues réguliers entre

les délégués. Les parties associées au réseau peuvent à leur tour mobiliser leur arrière-garde pour assurer la gestion de l'eau. L'offre d'opportunités en matière de formation, d'entraînement et d'accès aux réseaux professionnels constitue un moyen efficace pour renforcer l'implication dans le réseau de bassin et la conception de la vision, et contribue par conséquent à la transposition de la Directive cadre.

Recommandation 2: Lancer la conception de la vision et la mise au point des scénarios à l'échelle de l'ensemble du bassin au sein de réseaux informels

Une autre méthode de travail plus informelle stimule la communication et donne l'occasion de partager les préoccupations et les idées. Un plan d'approche peut être élaboré, en concertation avec des partenaires importants, en vue de l'établissement d'un plan de bassin reprenant des objectifs communs, un programme de mesures et une stratégie de communication.

Etendre méticuleusement la sphère d'influence de la commission fluviale afin de discuter des éléments communs de dépendance sans négliger la réalité des responsabilités territoriales propres des états membres.

Le réseau RIVER21 est un exemple d'un tel réseau informel : des universités situées dans le bassin coopèrent et expérimentent des méthodes pour les études de l'avenir. Un tel réseau peut être utilisé pour constituer d'autres réseaux informels ou être associé à des réseaux formels tels que par exemple le groupe Eau et Economie (Wateco), qui fait partie intégrante de la stratégie européenne de transposition de la Directive cadre.

Recommandation 3: Inviter les experts à soutenir le dialogue stratégique et libérer des moyens financiers à cet effet

Inviter des personnes à même de faciliter le processus, disposant d'une riche expérience dans le domaine du développement politique et des études prospectives et de la faculté de relier la politique de l'eau aux problèmes socio-économiques. Ces experts sont présents dans les entreprises internationales, les bureaux internationaux de consultance, les écoles d'administration et les universités qui enseignent les méthodes d'entretien stratégique. Il est à conseiller de faire appel aux experts qui peuvent appliquer les méthodes françaises et anglo-saxonnes.

Recommandation 4: Diffuser largement les informations et connaissances relatives au fonctionnement du bassin

La participation du public au processus décisionnel, la recherche du consensus et l'apprentissage institutionnel sont importants pour une gestion réussie du bassin. Il convient toutefois qu'une structure et stratégie d'information transparente non entravée par les frontières administratives puissent être organisée à l'échelle de l'ensemble du bassin. L'accès du public aux informations dans des formats accessibles est indispensable pour assurer un échange créatif d'idées à l'échelle du bassin, mais conditionne également le développement des capacités et l'évaluation de l'évolution. L'accès à l'information contribue fortement à créer un sentiment d'appartenance au bassin de l'Escaut.

En conclusion :

L'organisation pertinente du processus de planification **commun** dans un bassin hydrographique transfrontalier constitue le principal défi de la Directive cadre européenne sur l'eau. En nous basant sur une analyse des scénarios globaux de Shell 1998-2020, nous décelons la nécessité cruciale de consacrer des **entretiens stratégiques** à l'avenir des organisations riveraines des bassins hydrographiques européens en raison des opportunités et menaces qui se dessinent pour la gestion de l'eau. Dans ce contexte, il importe que ces organisations soient à même de suivre un **apprentissage institutionnel pour pouvoir assurer une coordination efficace**. Les dialogues stratégiques peuvent offrir un cadre de communication avec le public et les partenaires publics et privés. Ce n'est qu'au départ d'un tel cadre qu'il sera possible de concrétiser l'aspect essentiel de la planification, à savoir la fixation d'objectifs communs à long terme qui tiendront compte non seulement des facteurs écologiques et économiques mais également des forces sociales des régions situées à l'amont, dans la partie médiane et à l'aval du bassin. En l'absence d'un tel cadre explicite, il sera peut-être possible d'atteindre de façon légale les objectifs de la Directive cadre, mais toute gestion durable du bassin s'avérera impossible pour les générations suivantes et futures.

1

Introduction

The call for sustainable water management and other important developments in the European Union have increased the need for future-oriented and joint policy making in transboundary river basins. The Water Framework Directive, as adopted by the European Parliament in October 2000, is an important step in answering this need.

Universities can contribute to the implementation and further development of the Framework Directive through their role in education and research as well as through the European University networks. Indeed, universities from France, Belgium and the Netherlands are exploring new ways to educate the future European water managers.

In the period 1999-2002, five universities have developed the RIVER21 project. So far, seventy MSc and post-graduate students took part in the project. The participating universities[1] are ENGREF, Montpellier, Universitaire Instelling Antwerpen, Universiteit van Gent, Technische Universiteit Delft, and Wageningen Universiteit en Research Centrum. The combined university staff has developed a challenging learning environment in which students work on issues in river basin management according to integrated water management principles. In the field, students are introduced to the major water-related issues of a European transboundary river and asked to explore the future of water management in the basin in a systematic manner, together with their European peers. The results of the project are booklets presenting studies of the long-term future of the river basin as related to water management.

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[1] Initiators and staff members of the RIVER21 network for the Scheldt river basin are:

- Gabrielle Bouleau, ENGREF Montpellier, Centre of the National School of Water Management and Forestry, Montpellier, France;
- Patrick Meire, Monique Sys and Marleen Coenen Institute for Environmental Studies, University of Antwerp, Antwerp, Belgium;
- Marc Huygens en Ronny Verhoeven, Hydraulics Laboratory, Ghent University, Ghent, Belgium (in 2000 and 2001)
- Annemiek J.M. Verhallen Department of Environmental Sciences, Sub-department of Water Resources, Wageningen University and Research Centre, Wageningen, The Netherlands.
- Tineke Ruijgh-van der Ploeg, School of Technology, Policy and Management, Delft Technical University, Delft ,The Netherlands

In 2000, 2001 and 2002, the Scheldt river basin was the object of study. Each time, staff and students established contacts with experts and stakeholders from the Scheldt river basin to secure the "real-world" character of the project. Students met with stakeholders before and during the project to collect and share information. The presentations of the project to stakeholders at the World Water Forum 2000 in The Hague, but also at the Scheldt symposium, December 2000 in Doornik, drew a lot of attention to the method of vision-building and the results of the RIVER21 project.

Joint efforts in future studies, as explored in the RIVER 21 projects, may be an important way to overcome some of the difficulties experienced in transboundary river basin management. Vision building can stimulate and improve co-operation processes among riparian states. In this way, the shared dream of sustainable development and management programs on water resources in European river basins can gradually turn into reality.

Rijkswaterstaat Zeeland, responsible for the co-ordination of water management in the Dutch part of the Scheldt river basin, showed interest in the (educational) goals and results of the RIVER21 project. The agency kindly funded the writing of this report to enable us to document and disseminate the vision-building method that was used during the 2000 and 2001 RIVER21 projects, and to give an overview of the results of both projects. They agreed to have this report written in English so that the information can be made accessible to other (international) parties as well.

Contents of the report

The RIVER21 concept has been originally developed for university education but it may be suited for capacity building related to transboundary river basin planning, at other institutions as well. To enable this, we documented the different elements of the method (Chapter 3) and the theory of scenario development that it builds upon (Chapter 2). The results for the Scheldt river basin can serve as examples of problems and solutions in vision building (Chapter 4). We anticipate that this documentation of the RIVER21 projects can be used in educational settings directed towards capacity building for future-oriented water management in universities as well as other learning environments. We illustrate why the methods for strategic conversation that are used in the RIVER21 projects may be useful in preparing for the implementation of the European Water Framework Directive (Chapter 5) in formal and non-formal settings.

The vision-building workshops that we present are good examples of collective learning about future water management. These workshops lend themselves to experiment with organizing strategic conversations among different institutions that have a stake in transboundary water management. It is no surprise then that we explored how some of the lessons of the RIVER21 workshops can be used to enhance the co-operation within international river commissions (Chapter 6). At the request of Rijkswaterstaat Zeeland we

present ideas for co-operation and sensibilization in international river basins like de Scheldt. Possibilities for the implementation of article 14 of the Water framework Directive (consultation and information of the public) will be mentioned. Those ideas can also be of interest to participants of the third World water Forum that will take place in Japan in 2003. A support for the prolongation of the research and education network in an Scheldt21 network is one of our recommendations (Chapter 7). This network can be of help to all who are actively working in the implementation process of the WFD.

Future for the RIVER21 project

The RIVER21 project is a learning environment for both students and staff. We consider the projects to be a laboratory for research on (1) the educational aspects of teaching integrated water management to a cross-cultural group of university students, (2) the information needs for (public) participation in policy making for transboundary water management, and (3) the process of building scenarios and visions for integrated water management issues. Several publications have been written already to present the RIVER21 concept and to discuss findings of dealing with complexity in the systems analysis of river basins. Two staff members have started writing a dissertation on the topics of information supply and demand, public participation, and future-oriented policy-making in water management. ENGREF has published a so-called "living document" to meet a demand for information on the Scheldt basin and its management (see references for a site). This is an example that any river basin commission can use to make actual environmental information available for an interested public.

The last RIVER21 project was held in March 2002. Continuation of these projects is largely dependent on funding for student and staff mobility. In 2001, external funding was secured: the Socrates IP program of the European Union funded student and staff mobility. However, in 2000 and 2002 the universities funded these costs.

In 2002, the focus of the project was shifted from building a shared vision to developing a set of scenarios that can be used in evaluating river basin management plans. Problem analysis and fact finding through stakeholder interviews were given a more prominent place in the program. The results of the 2002 workshop can be obtained through the RIVER21 staff members. The results of the 2000 and 2001 projects are discussed in this report (Chapter 4).

2

Exploring the future: concepts, methods, examples

This is the first age that's ever paid much attention to the future, which is a little ironic since we may not have one.
Arthur C. Clarke

There are many methods for future studies. The 2nd World Water Forum in The Hague (2000) proposed scenario development as a suitable approach for strategy development in water management.

This chapter presents a short overview of methods for future studies and then focuses on scenario development. To illustrate this method for exploration of the future, three examples of scenario exercises are presented: the Shell Global Scenarios 1998-2020, the Mont Fleur scenarios from South Africa, and the Europe 2010 scenarios. These scenarios were developed following various approaches, since the objectives for the writing and the use of the scenarios differed.

Scenario development can be applied to issues of water management, but this is not commonly done. Vision building is yet another approach to prepare for the future. Elements of the scenario analysis method are very useful for vision building. Chapter 3 gives an overview of the vision-building method applied in the RIVER21 projects and its relationship to scenario development. Chapter 6 discusses the potential of scenario development to strengthen strategy formulation and to facilitate organizational learning in water management institutions.

2.1 Introduction

Futures studies have a long history. They go back as far as the Greeks studying the Oracle of Delphi. Systematic studies of expectations about the future, and the uncertainty associated with these expectations, are of a more recent signature. After the Second World War, methods for systems analysis and scenario development were developed and applied on a large scale. First, the defense industry and the U.S. Army stimulated such research, but it was soon apparent that the society at large could benefit from future studies also. RAND Corporation in Santa Monica, CA, under leadership of

mathematician Kahn, laid the ground for scenario development. Later, in the sixties, the Oil Company Shell applied the scenario development method for strategic management of Shell's diverse enterprises in oil exploration, exploitation, and refinery. The value of this method became obvious when this company turned out to be better prepared for the 1970 oil crises than its competitors (Schwartz 1991, 1996). In that same time period, the Club of Rome started using newly developed quantitative modeling tools for trend-analysis to assess the extent of future environmental problems (Meadows 1992).

Right now, more than fifty years later, there is a wide range of methods available to explore the future. A simple grouping of the more common methods is to make a distinction between the so-called *formal methods,* based on a mathematical approach, and the so-called *normative methods*, which are based on expert knowledge and judgement. Good textbooks and web sites on the subject matter are widely available. (See section 2.7 of this chapter and the reference list for on-line resources and textbooks.)

2.2 Formal and normative methods for future studies

Formal exploratory methods, or forecasting methods, make use of a mathematical or formalized approach. These methods rely on historical data. They predict future trends based on either extrapolation of trends from the recent past (e.g. prediction of future water demand based on data of water use in the past twenty years) or application of known trends of analogous development (e.g. prediction of developments in European unification based on the history of the federalization of the states of the U.S. of America). The formal methods use quantitative models to predict the future state of a system, but the mathematical base for these models varies according to the application. Compare, for instance, the mathematical equations and databases needed for (a) a policy analysis study to estimate the impact of climate change on flooding in the coming 50-100 years, (b) for the prediction of peak heights of future floods, or (c) for a flood early warning system. The characteristic processes of these events, their time and spatial scales, differ largely. Consequently, the formalization of the different processes, the input and output data of the models are not alike.

With or without quantification, extrapolation is always based on the presumption that trends and assumptions that were true in the past will hold in the future. Such predictions about future conditions assume continuity of known trends and therefore are called *surprise-free scenarios*. The presumption of continuity is often not warranted, however, and may lead to false predictions and wrong decisions. To solve this problem, quantitative methods may be combined with different approaches. For example, the method of Trend Impact Assessment (TIA) does not assume continuity *per se* but investigates which factors may lead to sudden changes or trend breaks and assesses their impact. Trend impact assessment produces a wide range of possible futures rather than a single prediction. The set of uncertainties that is used for trend impact assessment is based on expert knowledge. This

expert knowledge can be solicited through the Delphi method or other methods (van der Heijden, 1996).

Formal methods thus are based on the use of quantitative data and on extrapolation methods that have been tested and validated. The formal methods are considered more or less objective even though the formalization of extrapolatory research relies on independent choices of the expert modeler or expert user.[2]

Normative or judgmental methods. Expert-based methods are not formalized and the knowledge of experts includes normative and judgmental aspects. Well-researched expert-based methods acknowledge this explicitly and describe how experts can be selected in an appropriate manner concordant with the purpose of the method as well as how their knowledge is solicited. The *Delphi-method* and the *scenario development method* are two well-known methods designed specifically to draw on expert opinions for futures studies. Both methods originated in the military but can be applied to other areas of interest. The Delphi-method is based on written surveys of experts about their expectations of the future and is suitable for consensus-seeking research on single subject issues.

For instance, a Delphi-method may be applied in research on the role of water treatment technologies in the future. The scenario development method is well suited for issues in which a wide range of expert judgements is sought. This method is designed to be used by interdisciplinary groups of experts. Scenario development may be applied, for example, to explore the factors that will determine water demand in the future or to explore the future tasks for water management authorities.

Scenarios are well-documented stories (or scripts) about future situations. Often a period of 20-30 years is taken as the time frame in which the stories may develop. Scenarios are not forecasts; they do not predict what might happen based on extrapolations of trends or past experiences. Scenario development offers possibilities for an *impressionistic* (focussing on specific events) or a more *analytical approach* (focussing on the unfolding of basic processes). Either way, the resulting scenarios must be plausible and consistent. This demands that scenarios be constructed with rigor, detail, and creativity. Scenario development can be considered a craft rather than science, but it uses the scientific method. As is true for other crafts, the techniques can be taught but the success relies on talent as well as technical skills.

Scenario development is done for different purposes, under different circumstances and with different results. Scenarios can be used to review long-term (business) strategy, to support the design of a specific project, in the context of tactical or short-term decision-making, or to prepare crisis

[2] Examples of the application of formal methods to strategy development in Dutch water management are the PAWN study and the "Watersysteemverkenningen" carried out in the late 1980's and 1996 to prepare national water policies (Stans and Groot, 1990; Baan *et al.* 1997).

management. The overall purpose of the scenario project may differ as well: scenario development can aid in building consensus or to boost moral in an organization by focusing attention towards the future. Examples of scenarios that were developed for different purposes are presented in section 2.6.

The word scenario may carry different meanings in other fields of study. In modeling studies, scenarios describe the uncertain conditions to which a system is subject and that influence the system outcome (e.g. spatial and temporal distribution of precipitation in a river basin for any given year determines the water distribution in the basin for that period). In modeling, context scenarios are constructed based on a relevant set of exogenous variables that represent the range of conditions under which the outcomes of a model must be tested. Context scenarios are developed to test the sensitivity of the system for a range of conditions that can not be influenced by the decision-maker.

In policy development the word scenario has a different meaning altogether. Policy-makers often use the word scenario to mean a set of policy measures (or tactics). We prefer the use of the word strategy for a set of tactics, and alternative strategies for the range of strategies to be studied in a policy analysis study.

2.3 Scenarios and systems thinking

The systematic approach to scenario development that we present is grounded in the concepts of systems thinking and systems modeling. Figure 2.1. shows the simplest of systems models (A): the system is depicted as a (black) box and delineated by system boundaries. A system can consist of different components that are interrelated. Sometimes, subsystems are identified.

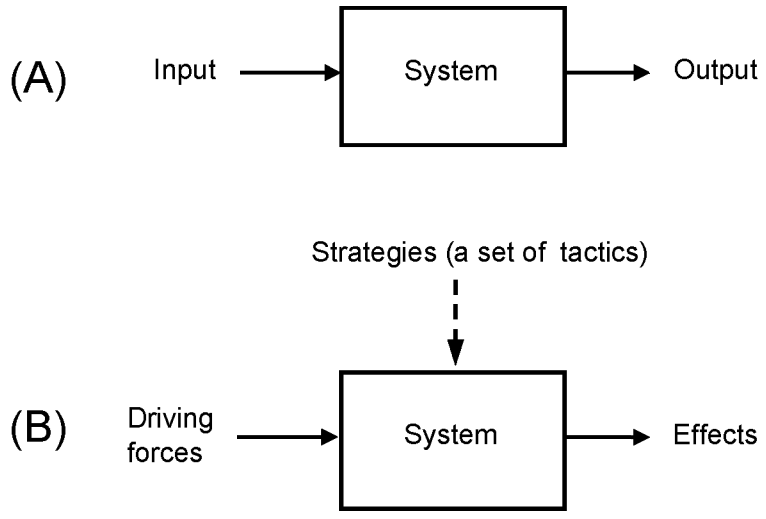


Figure 2.1: System models, influences on system structure and system effects.

The system boundaries separate the system from its environment. Variables that indicate the system performance or system outcome can be considered system output. System input consists of exogenous variables (belonging to the system environment). When system input changes, the system output changes in a more or less predictable manner. The extent to which system outcome can be predicted depends on the uncertainty related to the system structure (do we understand the system well enough to be able to predict its response to changes in its environment?) and the uncertainty related to the system environment (do we know the system environment well enough to be able to understand what variables exist and to distinguish which variables may influence the system?).

This simple system model (A) can be adapted for use in scenario development as shown in (B). The system is altered or managed through the implementation of different tactics. The output variables are now called *effects* because they concern the output variables that are of interest to those parties that have a stake in the management of the system. Effects are directly related to stakeholder objectives for system management.

The input variables that are being considered in (B) consist of two sets of variables. Most important is the identification of the factors that drive changes in the system and cause the internal system variables to change. These variables can be named *driving forces*.[3] The other set of variables is named strategies; these are the management tools or policy instruments. Strategies are sets of tactics that can change the system structure through deliberately changing the internal variables of the system. The effectiveness of various strategies will differ depending on the changes that driving forces bring about.

As we wrote, there are different meanings attached to the word scenario. In this context, it is important to also make a clear distinction between two different types of future scenarios, namely context scenarios and policy scenarios.

Context scenarios describe plausible ways in which a system environment may develop. *Context scenarios* are written in terms of the relevant exogenous variables and the system outcome. These scenarios are developed through an analysis of driving forces, which may be changes in any of the categories of economy, technology, politics, nature or public affairs (Schwartz, 1996). A context scenario describes how system effects change

[3] Similar to scenarios, the concept of driving forces means different things to different authors. We identify with Peter Schwartz's use of the concept of driving forces: the elements that move the plot of a scenario, that determine the story outcome (p. 101, 1999 edition of 1996 publication). E.g. climate change is considered a driving force for the future water distribution in a river basin. Indeed, the rate and character of climate change will have an effect on spatial and temporal distribution of the precipitation, two important exogenous variables for water distribution. Another reason to consider climate change as a driving force is the effect it may have on the exogenous variable temperature, and therewith on crop patterns and crop-related water demand, both internal variables of the river basin system.

under the influence of a specific set of driving forces. Context scenarios can be used to test the robustness of a (preferred) strategy. They can help answer the question if a strategy will be able to bring about the desired effects under a wide range of (future) circumstances. The Shell Global Scenarios are a good example of context scenarios (see section 2.6).

A p*olicy scenario* is a story about the desired future state of a system. The policy scenario describes how a system is structured and how it performs. In other words, *policy scenarios* are written in terms of the relevant internal system variables and system output. It is not uncommon to develop a set of policy scenarios, and may include a doom scenario, a business-as-usual scenario, and/or a desired future. The differences between these scenarios can then be used to put issues on the political agenda. One scenario developed by the Club of Rome (Silent Spring) did just that: it put the environment on the political agenda.

Sometimes, policy scenarios concentrate on a desired future state. These scenarios are presented as a *Leitbild* or *vision.* In that case, the scenario may be used to create political will for certain actions in order to achieve the desired future. The 2nd World Water Forum developed a vision of a world in which all people have access to safe and sufficient water resources. The ultimate purpose of the development of this vision was "to generate global awareness of the water crisis that women and men face and of the possible solutions for addressing it" (Cosgrove and Rijsberman 2000).

Policy scenarios should not be confused with strategies. Strategies are sets of measures (policy instruments or management tactics). Certain strategies may be helpful to realize a policy scenario; others may not be effective for that purpose. It is very helpful (if not imperative) to explore the future of the system environment before a policy scenario is scripted.

2.4 Scenario development: many ways leading to Rome

Scenarios differ in what they describe (system environment or system structure and performance), in the way that they describe these matters, and in the extent to which they rely on actual information. By definition, scenarios reflect the norms and values of the scenario builders as well as the way in which they understand the system. Also, scenarios are built on assumptions about uncertain aspects of the system. Use of the scientific method and other systematic methods is important to ensure the transparency, plausibility, and consistency of the scenarios. It has taken more than twenty years for scenario development methods to come into common use. Godet claims in his web-based teaching manual (1999, 16) that there is even more time needed for scenario development methods to become used correctly.

The first step in developing scenarios is to bring together a team of experts that can build scenarios. The scenario team always includes a variety of experts who are visionary thinkers on a wide range of subjects. Van der Heijden (1996) writes, *"Team members need to be able to suspend disbelief, think the unthinkable, and let intuition and premonitions flow freely. Therefore*

a necessary skill for team members is tolerance for ambiguity. (meaning that there can be more interpretations)."

It goes without say that the composition of the team must match the purpose of the scenario development (see the examples in 2.6). For instance, the team of experts for the Shell Global Scenarios consists of experts from within Shell and representatives from the global business and political community. In this way the team is able to develop context scenarios that are useful for testing the robustness of the company's commercial strategies. The Mont Fleur scenarios, on the other hand, were developed by representatives of different political fractions in South Africa and supported by experts in scenario development. The composition of the team enabled the building of policy scenarios in which the entire political community could recognize threats and opportunities for the development of South Africa after Apartheid.

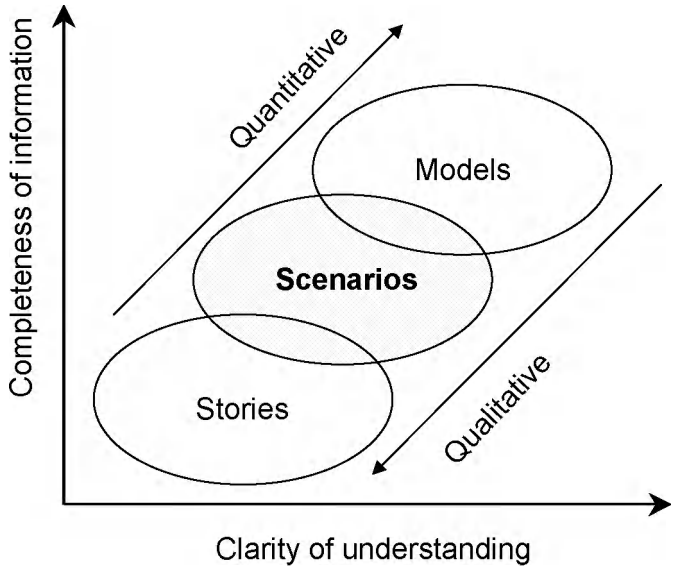


Figure 2.2: Comparison of models, scenarios and stories (Source: Shell Global Scenarios 1998-2020)

A scenario development team starts with gathering data in relation to the system of interest, the system environment, and the system effects. At this stage, the drawing of the system boundaries is a critical step. Depending on the data that are used, a scenario can be more quantitative or qualitative (Figure 2.2). Models can also supply quantitative data so that information on trends and their effects can be included. Qualitative data may be supplied by literature, scenario team members or experts that are consulted by the team. These data can be collected through desk research, brainstorm sessions and in-depth interviews. Qualitative data are needed on the system (internal variables and their relationships), variables for measuring system performance, cause-effect relationships within the system, and causal relationships between driving forces and system performance. Stories about

possible changes in the system and system environment are also a possible source of information.

Once the basic data have been collected, there are still methodological choices to be made to start the process of building or structuring a set of scenarios. Van der Heijden (1996) distinguishes *inductive and deductive methods* for scenario development. The inductive approach builds step by step on the data available; the structure of the scenarios emerges by itself when stories are composed from a series of possible events. The deductive method, however, starts with an overall, polarity framework and data are fitted into the framework. Such a framework often consists of two axes representing the two most important driving forces for a particular scenario exercise (Figure 2.3). The Mont Fleur scenarios were developed with the inductive method; the development of the Europe 2010 scenarios followed a deductive method (see section 2.6).

Preference for these methods depends on the personal style of the facilitator, time available for the project, and the diversity of thinking in the scenario team. The results of the inductive and deductive methods do not need to differ. In some situations, neither method is suitable. Van der Heijden suggests a third method, the so-called *incremental method*, to be used with groups that are not yet convinced of the value of scenario development. In the incremental method, a first step is to acknowledge that the scenario development group is counting on certain future developments and to describe the assumptions on which the expectations rely. Next, the group writes several "*What if….*" scenarios by challenging the assumptions on which the 'official future' is based.

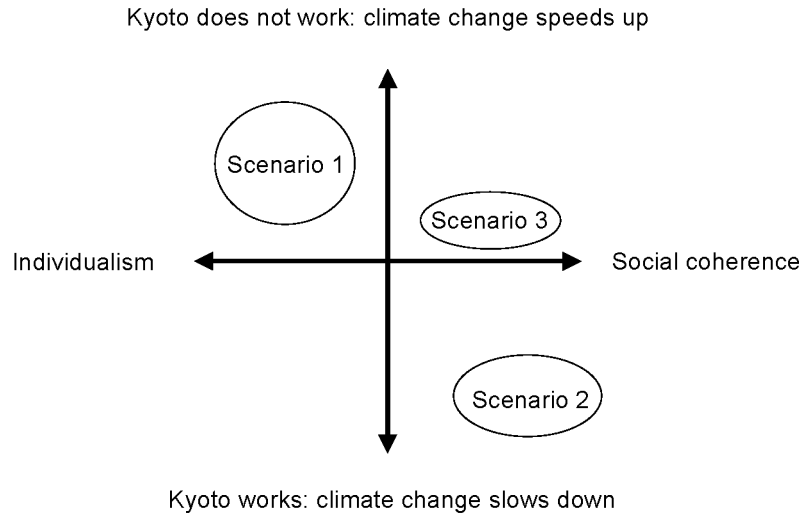


Figure 2.3: An example of a framework to structure scenarios in the deductive method

2.5 Scenario development for the water sector

Although water managers commonly use quantitative modeling tools to support planning and operational decisions, it was not until recently that methods like scenario development were applied towards strategic planning in the water sector. In 1998, the World Water Council chose to use scenario development as a method to ward off the pending crises in freshwater management all over the world (Cosgrove and Rijsberman 1998). This choice was explained in the message to initiate the regional and sectoral consultations for the world water vision (World Water Council 1999):

> *"Scenario development challenges us to ponder critical issues and to explore the universe of possibilities for the future. Such analysis also clarifies different world views and values, challenges conventional thinking, encourages debate, and provides a common framework within which different stakeholders can address critical concerns and identify alternatives. Because scenarios embody the perspectives of their creators, either explicitly or implicitly, they are never value free".*

There are several plausible explanations for this new or renewed interest in scenario development. In general, there is a growing interest in strategic planning in and outside the business world, as demonstrated by the large numbers of book sold on the issue (see for instance the web site Amazon.com). There are three developments in the field of water management that stimulate an interest in strategic planning and scenarios in particular: the focus on sustainability, the call for public participation in (strategic) decision-making, and the emphasis on (international) cooperation in water management. These developments synchronize with the recognition of scenario development as a proven method for work on strategy formulation.

Sustainability In 1989, the Brundlandt report initiated a worldwide interest and active search for strategies to manage the natural, economical and social resources in sustainable ways. To achieve sustainability, the interests of future generations must be secured. One could say that this commitment to the well being of the future generations has changed decision-making. With the change from short to long-term planning, the uncertainty about the future gained a prominent place in planning exercises. It became obvious that planners must learn how to deal with the uncertainty about the needs of future generations and about possible trends and trend-breaks in relation to environmental resources management. The traditional, formal methods for forecasting do not suffice for dealing with this type of uncertainty. However, experiences with scenarios in planning large business operations gave confidence that scenario development would be able to cope with uncertainty in environmental planning. For example, the World Business Council for Sustainable Development (WBCSD) used scenario development to stimulate broad discussion on the challenges for a sustainable development for businesses and industry (see section 2.7, iv).

Cooperation in water management across sectors and borders. More and more, water management requires stakeholder cooperation to be able to achieve sustainable, and thus efficient and equitable use of water resources. Within-sector cooperation is often well developed, think of irrigation schemes involving many farms or water supply services for large groups of households. Inter-sectoral cooperation is more difficult because the objectives for water management tend to disagree. In those cases, integrated water management tries to find ways to allocate water resources among stakeholders with different economic, social or other interests. Such intersectoral cooperation is especially important in solving conflicts when water is scarce or when the use of water by one sector impedes the well being of another sector. In transboundary water systems, the need for cooperation is even more apparent when the water management in the upstream region hampers the activities in the downstream region.

An important aspect of integrated water management is to find common goals and strategies to achieve these. The goals should reflect a mid-term or long-term vision for the social and economic activities of the different stakeholders or riparian countries. The history of water management teaches that solving differences in short-term goals creates new problems, whereas the search for strategies to meet long-term goals opens up possibilities to create win-win situations.

The need for implementation of the European Water Framework Directive should been seen in that light. Cooperation within river basin by the different stakeholders according to well-defined plans is needed to improve the water quality of surface water and groundwater and to restrict the overexploitation of water resources.

Public participation in strategic planning. Civilians, non-governmental organizations, and businesses participate more and more in the decision-making regarding complex societal and environmental issues. The European Water Framework Directive attaches high values to public participation in the planning of water management (EU 2000).

A participatory planning process may be organized by the government in order to create commitment to plans for change and development. Also, participation can be demanded by the public so that they can have a chance of influencing the outcome of the planning procedures. Either way, the extent of the democratization of the planning process depends on the choice of planning methods and on the game rules which guide the planning process. Such methods and rules determine if participants are able to bring in their expert knowledge on the subject matter (content) and planning process. Since scenario development is designed to combine expert knowledge of diverse resources, this method is well-suited to accommodate participatory processes and draw input from people involved in the problem situation, the planning and/or implementation of action (Tijink 1999). The COOL-project (Climate options for the long term) is a recent example of a participatory process that uses scenario analysis to support the dialogue between different stakeholders. The project uses future scenarios to promote the coherence and consistency of policy assessments at different institutional levels (see section 2.7, v).

2.6 Relevant examples of scenario development

To gain some insight in the wide range of possibilities for the application of the method, we present three examples of scenarios. They illustrate the previous texts and may act as inspiration for other scenario development exercises. A fourth example pertains to the Search Conference, a planning method that is gaining renewed attention in community planning and that should not be confused with future studies. For further reading on these and other scenario projects, see section 2.7.

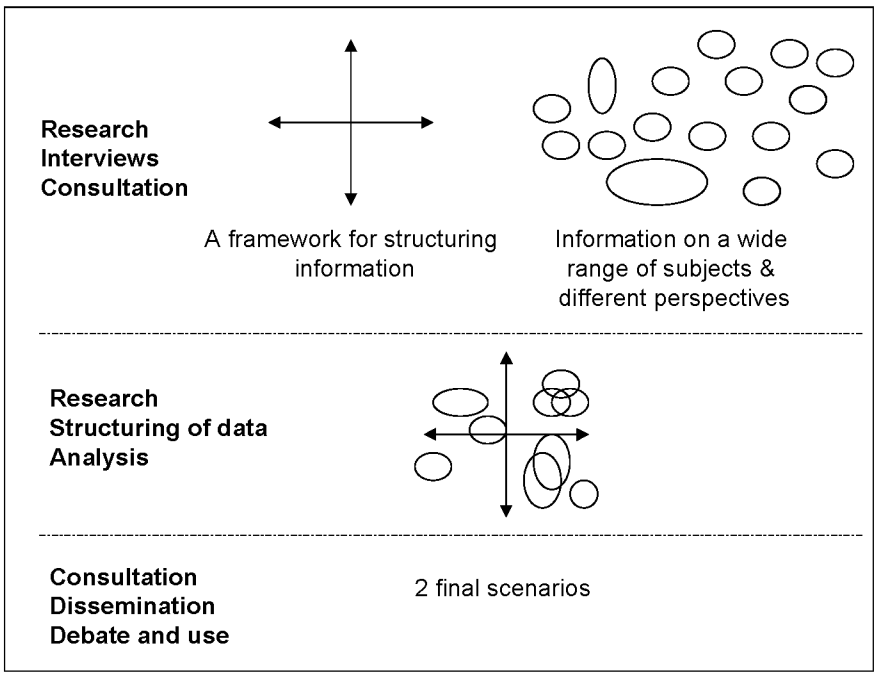
2.6.1 SHELL Global Scenarios

Purpose The Royal Dutch/Shell Group is a decentralized group of companies with high autonomy in directing their operations. Shell possesses a long corporate history of scenario planning. Since the early 1970s, the company has developed so-called Global Scenarios about the future of the world. The most recent scenarios were published in 1992, 1995, and 1998.

The purpose and role of the scenarios has changed over the years but they are still crucial in creating a common culture, or language, through which the future can be imagined. First, scenarios were developed in a structured and regimented manner. Now, the process of large-scale scenario development is embedded in the company as part of a continuing, strategic dialogue. Scenarios help foster group cohesion through creating unifying themes and images (Shell, 1998).

Scenario teams at Shell change every planning period. Many times, a person from outside Shell has been asked to head the scenario team to ensure that new insights could enhance the scenario development (Jaworski, 1996). Likewise, the people consulted during the scenario building process vary over the years. Intuition and creativity are allowed to influence the composition of the team members.

Scenario Development The process of scenario development in the 1990's starts out with a period of data-collection in search of new knowledge through interviews with remarkable people, inside and outside of the Shell companies. The scenario team travels across the world to be able to develop a perspective on global developments. The next step is to construct a framework that facilitates the structuring of the information gathered. The construction of this framework may come about in different ways. It is almost an artistic task to recognize and conceptualize the patterns that are hidden within the information collected (Van der Heijden, 1996).



Results The results of the scenario exercise are two or three scenarios that reflect on possible changes in power, technology, and economy. Each scenario carries a name to indicate the nature of the world it describes. In 1992 these names were "New Frontiers" and "Barricades." The scenarios address the stability of the world's political situation; institutional developments and global treaties which impact oil consumption; the emergence of technology and impacts on the production and market for oil.

The scenarios are disseminated on a large scale and in different ways Shell publishes an attractive booklet with the global scenarios for the public at large, but also videos and company presentations to share results and introduce the language in which the future can be framed. The publication of the scenarios is a media event.

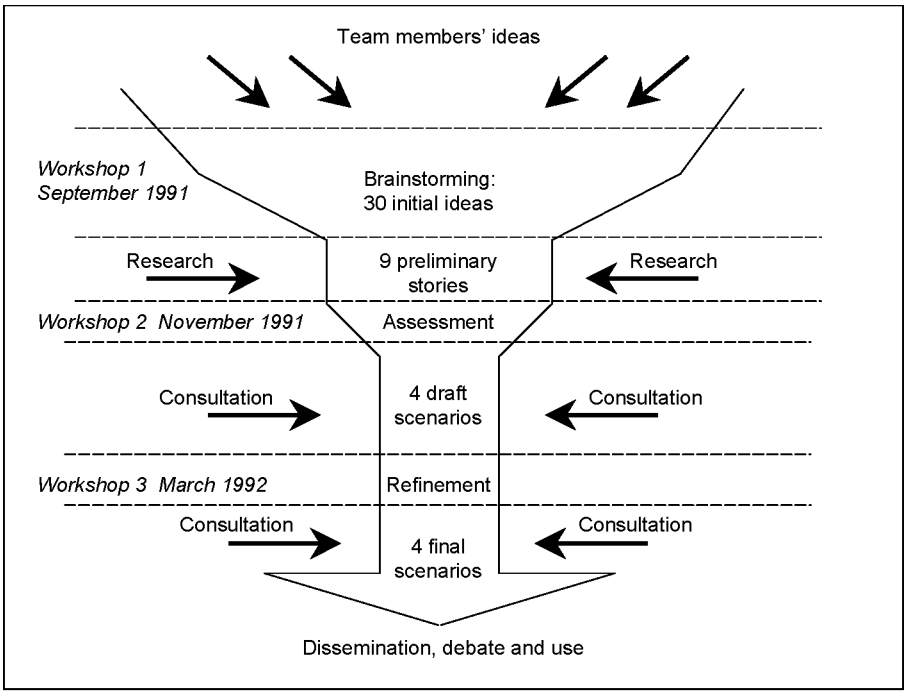
The main result of the scenario exercise is the actual use of the scenarios in the different Shell enterprises. In the words of Ged Davis, a vice president from Shell: *"Building scenarios is about widening of perspectives. Using scenarios is about widening options."* The scenarios are used to challenge assumptions in strategies (*what if....?*), to identify risks and opportunities, to develop strategic decisions, and to develop customized scenarios for local businesses. The building and use of the scenarios is not limited to Shell only; both internal and external parties are involved.

2.6.2 *Mont Fleur Scenarios*

Purpose The Mont Fleur scenarios were developed in 1991-1992, in preparation of the first all race elections to be held in South Africa in 1994. This was a very uncertain time for the country, since Nelson Mandela was released from prison and political organizations like the African National Congress, the Pan African Congress, and the South African Communist party were being legalized.

The scenario methodology was used to plot possible pathways into the future of South Africa. The scenario exercise was chosen as a way to create a common language for the discussions about the (economical) future of South Africa.

Scenario team The project brought together 22 South Africans from a variety of backgrounds, both ideologically and professionally (politicians, academics, activists and businessmen). This multi-racial team was sought out to be inclusive of all-important perspectives on the future direction that South Africa should or should not take. The team met three times (over a period of 7 months) at the Mont Fleur conference center, for three-day workshops facilitated by Adam Kahane of Shell International in London. A team of analysts (from South African universities and industry) supported the development of the scenarios, doing research to support the development of a set of logically internally consistent and plausible scenarios.



Scenario development The scenarios were built from an initial set of 30 stories, dreams, and nightmares, told by the participants about what might happen to South Africa. All stories were told from the vantagepoint of 20

years in the future. The stories were examined, discussed, and narrowed down to four useful stories. These scenarios all focused on the nature and impacts of the political transition.

Political Context The project was carried out in a highly charged political atmosphere (Kahane, 1992). To avoid discussions about the different party platforms, Adam Kahane chose to focus on futures that might happen rather than desirable futures. Interestingly enough, the final product of the scenario exercise was a scenario all team members preferred because it resulted from a common understanding of the different futures that could develop in 20 years and the impacts of such futures on the economy and well-being of South Africa.

In comparison with typical Shell scenarios, the four scenarios for the future of South Africa were not very deep. There was little research and quantification carried out to support them. Also, the development of these scenarios relied much more on narrative, on traditions of storytelling, than on analytical methods. Nevertheless, the scenarios were powerful in revealing valid mental models of how the future might unfold. The scenarios created a common language about the possible developments of South Africa that was easily communicated, in public meetings and through publication of the scenarios in the major South African newspaper. The names of the different scenarios (Ostrich, Lame Duck, Icarus, and Flight of Flamingos) were adopted by the public and came to present a political attitude towards the future of South Africa. President De Klerk once declared in an interview "I am not an Ostrich."

Results produced by the Mont Fleur project were (Le Roux, 1997): (1) substantive messages about the future of South Africa, (2) informal networks of influential people across the political divide, and (3) a changed way of thinking.

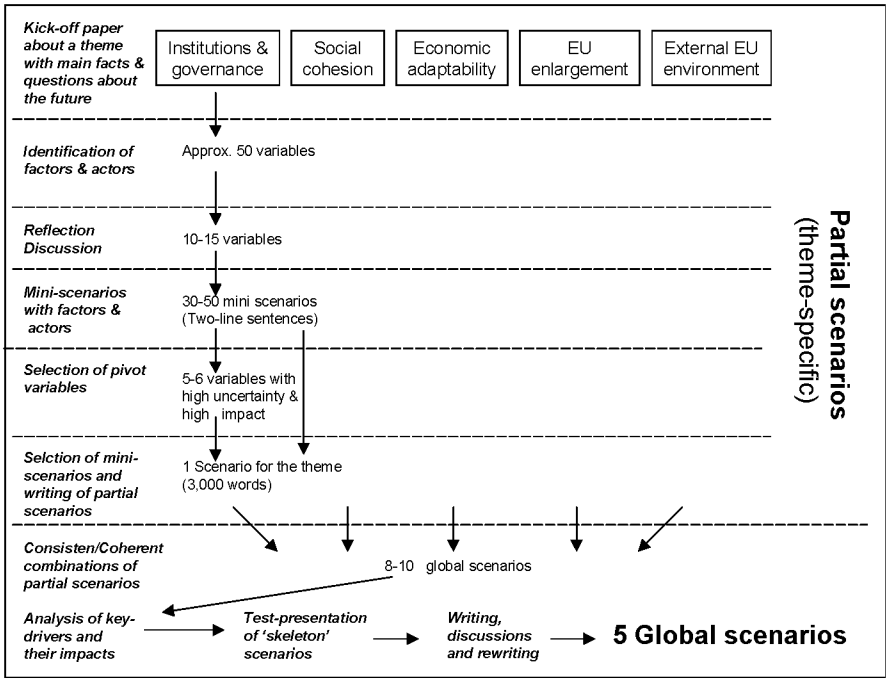
The third result, the common ground that was created during the process, is perhaps the most powerful but least tangible. This common understanding was reached through a thorough analysis of the present situation and on the understanding of the relationships between different modes for political transition and the resulting social, political and economic conditions.

2.6.3 Scenarios Europe 2010

Purpose The objective of this project was to produce a set of coherent and thought-provoking images of the future of Europe. Study of the scenarios was to encourage reflection and debate on the changes that are taking place and on the choices that lay ahead of the European Union and its citizens. The scenarios were primarily meant to serve the work of the European Commission and to improve policy development.

Scenario team The scenario team consisted of a core group of civil servants from the Forward Studies Unit, a department of the European Commission

which directly reports to the president of the Commission. The core team was responsible for the organization of the process and the actual writing of the scenarios. During the various stages of the process, the core team was supported by a group of 60 experts from different Directorates-General of the European Commission. Important contributors from international institutes were the French *Conservatoire National des Arts et Métiers (CNAM),* the Dutch institute *Clingendael,* the Anglo-American *Global Business Network,* the German think-tank *EUCIS,* the association *Futuribles International* and strategic think-tanks of large companies such as Shell.



Scenario Development The process of writing the Scenarios for Europe in 2010 started in 1997 and took two years. The elaborate process of scenario writing is summarized in the figure above. The process is a combination of methods used by *Futuribles* and *CNAM* and owes much to the methods of the *école française (*working with themes, analysis of variables such as shaping actors, shaping factors, partial scenarios, and global scenarios). Methods for brainstorming were borrowed from the Anglo-Saxon tradition in scenario building.

The report on the Europe Scenarios gives details on the methodology. The iterative process of differentiation and consolidation involves different groups of people. Also, in the final writing of the scenarios, consultation was important to secure the internal coherence and consistency of the scenarios. However, the process of sharing the scenarios with members of the European Commission and European Parliament, member countries or the public at large was not considered an integral part of the methodology.

Political Context The political context in which these scenarios were drawn may be characterized by (a) the uncertainty of the consequences of

expansion of the European Union with Eastern-European countries, (b) the process leading up to introduction of the Euro, and (c) low voter response during EU elections.

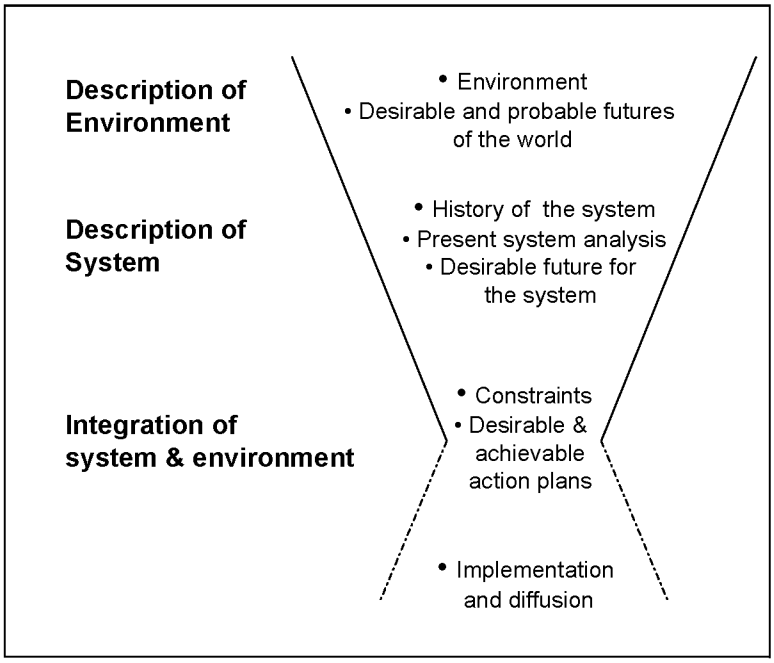
Results The exercise produced a methodology, a glossary, and 5 very detailed scenarios (each 4,000 words). Titles of the scenarios are: Triumphant markets, The Hundred Flowers, Shared Responsibilities, Creative Societies, and Turbulent Neighborhoods. The methodology is transferable; the government of Norway adopted the methodology to write scenarios for Norway in 2030.

2.6.4 A different approach: Search Conferences

Examples of successful search conferences can be found on the web site of the Future Search Network (see section 2.7, VI). The main difference with scenario development is the focus on possible and desirable futures rather than exploring plausible futures.

Purpose The initiative to develop the search conference method goes back to the idea that public participation, and especially community participation, in planning is warranted now that the world changes rapidly. (Emery and Purser, 1996). The purpose of the method is to design plans that can be implemented.

Scenario team The team consists of representatives of the community that seeks to find a common ground to build a future together. Facilitators that are trained in this method support the team.



Scenario Development The principles on which the method is based, guide the process and honor the democratic aspects of a common search. To be able to achieve its goals, the search conference method starts out with exploring ideas about probable futures. This is a first step in the process and not the final objective, as it is in scenario analysis. Consequently, it does not receive much time relative to the entire process and the exploration of futures is not systematic and structured as it is in scenario development.

Results The results of this method are action plans that can be implemented at the local level. As such, the search conference method is more a method for strategic planning device than a method for future studies.

2.7 Online resources: web sites and literature

The following web sites give information on scenario development and planning or forecasting. Some sites publish pdf files on the subject for teaching purposes and to assist researchers and practitioners.

I

The web site of the Global Business Network provides an **excellent bibliography on scenario planning**, edited by Kees van der Heijden, Nijenrode University, the Netherlands:
http://www.gbn.org/public/gbnstory/ex_bibliography.htm

II

The **Royal Dutch/Shell Group** has used scenario planning, and worked on improving the methodology, since 1970. The web site gives access to the most recent Global Scenarios that were made by Shell and many other publications about scenario development (use the search option to find the scenario literature). http://www.shell.com/

III

The **Global Business Network** is a worldwide learning community of organizations and individuals and was created in 1987. This network offers consulting and training in scenario development. The web site offers access to publications on the subject of scenario development. Two important authors, **Peter Schwartz** and **Kees van der Heijden** have been involved in the network from the start. http://www.gbn.org/

IV

The **World Business Council for Sustainable Development** (WBCSD) is a coalition of 150 international companies united by a shared commitment to sustainable development. The WBCSD's involvement in scenarios is based on a belief that better corporate decision-making, sensitized to the needs of a sustainable future, will help to foster the type of collective action needed to attain sustainability and, at the same time, make for better business. (Use the search option to find the scenario literature). http://www.wbcsd.org/projects/tools_scenarios.htm

V

The **Climate options for long term Project (COOL)** explores long term strategies for national climate policy in an international context. The project uses and develops participatory methods for integrated assessment of climate policy to support a dialogue between different parties and stakeholders. Scenario development is one of the methods used by COOL. http://www.wau.nl/cool/cool.htm

VI

The **Future Search Network** maintains an extensive web ite on the use of the Search Conference method in support of the many consultants that use this community-oriented vision-building method. The web site offers information on method and design, a bibliography, case studies, and access to the network of consultants. http://www.futuresearch.net/

VII

The **Centre for Organisational Learning and Change** at Universiteit Nyenrode, the Netherlands, is a competence center striving to do innovative research about processes of learning and change in organizations. The Center organizes, among other things, workshops on scenario thinking and systems thinking. Rijkswaterstaat is an official sponsor of the Center. http://www.nijenrode.nl/int/

VIII

The work of Professor **Michel Godet** and scenario development teaching materials can be found at the web site of **LIPS Laboratory for Investigation in Prospective Strategy and Organization.** LIPS is a Department of the French National Conservatory of Industrial Arts and Crafts (CNAM), a major public institution of higher education and research of the French Ministry of Education, Research and Technology. http://www.cnam.fr/deg/lips/

IX

The **Forward Studies Unit** is a department of the **European Commission**. The unit has published five possible scenarios for Europe in 2010. These scenarios were developed with a research method designed to bring out the diversity of Europe (shaping factors, shaping actors).
http://europa.eu.int/comm/cdp/scenario/index_en.htm

X

Professor J. Scott Armstrong of the Wharton School created a web site on forecasting with funding of the International Institute of Forecasters in 1997. The web site publishes a pdf file which summarizes his book "**Principles of Forecasting: a handbook for researchers and practitioners**". http://www-marketing.wharton.upenn.edu/forecast/

XI

The Millennium Project of the **American Council for the United Nations University** is a global participatory futures research think tank. The Millennium Project produces the annual "State of the Future", "Futures Research Methodology" series, and special studies such as the Future Scenarios for Africa, Lessons of History, Environmental Security, Applications of Futures Research to Policy, and a 300+ annotated scenario bibliography. http://www.geocities.com/~acunu/millennium/Millennium_Project.html

XII

The **School for Technology, Policy and Management** at Delft University of Technology teaches policy analysis and scenario development for design and management of infrastructures (water, energy, transportation, and telecommunications). Courses are part of an international program leading to an MSc degree in Systems Engineering, Policy Analysis and Management. http://www.tbm.tudelft.nl/

XIII

Wageningen University offers several MSc programmes related to management of environmental resources. Methods for forecasting and scenario development are taught in the Environmental Sciences program http://www.wau.nl/studieg/msc/gids/h250.htm, and in the highly innovative program for Management of Agricultural Knowledge Systems. http://www.wau.nl/studieg/msc/gids/s11.htm.

3

Methodology used in RIVER21, a vision-building workshop for MSc students

The past can only be described, but we can write the future together.
Federico Mayor, former Under-Secretary-General and Director-General of UNESCO

The RIVER21 workshops were designed with educational objectives in mind. The method for vision-building was designed by borrowing elements of systems analysis and scenario development (see Chapter 2). The RIVER21 educational method can be summarized as 'learning by doing.' The vision-building team works together to develop a shared vision for a river basin that they have studied beforehand. The team works with actual data, gathered from literature, interviews and from first-hand experience. The workshops so far have used the transboundary Scheldt river basin as a case for vision building. RIVER21 participants had training at graduate level in water management or related sciences, and were by and large familiar with integrated water management concepts. This chapter describes the method that was applied in building a vision. Chapter 4 describes the results of two vision-building exercises in 2000 and 2001.

3.1 Vision *versus* scenarios; a clarification

The RIVER21 project was set up during the preparatory phase of the World Water Forum 2000. The theme of the World Water Forum "From vision to action" inspired us to draw more attention to future studies in educational programs of future water managers. The purpose of the project was to create an opportunity for an international group of university students to develop a shared vision for a shared river basin. The RIVER21 project is designed to achieve consensus on long term goals for river basin management. This objective sets vision building apart from scenario development. Chapter 2 describes how scenario building produces stories about *plausible futures.* Vision building, however, is geared towards producing a single story about a

desirable future. In other words, a vision is a policy scenario rather than a context scenario (See section 2.3).

To develop a vision for river management, we have chosen to combine methods for problem analysis and goal formulation with methods for future exploration. In the RIVER21 project, participants first focus on understanding the dynamics of the river basin system and the value of the water system to society (the so-called system performance). Later, the attention is turned towards the future and to how exogenous driving forces may change the system. In this way, students first acquire a shared understanding of the present before they explore the future. Also, having system knowledge, they are better prepared to identify the critical exogenous factors that may cause changes in the river basin system.

In the RIVER21 approach, participants identify desirable as well as undesirable performance characteristics of the river basin system under different plausible futures. In this way they can form an opinion about the importance to both strive to achieve certain futures and to avoid others. Unlike scenario development, the vision-building method asks for a normative approach and negotiation to come to consensus on the desirability of different futures. An important difference with the Search Conference method (Section 2.6.4) is that the vision-building method of RIVER21 stops short of developing practical (technical, regulatory, administrative or communication) measures or strategies to achieve the shared desirable future.

RIVER21 projects identify the major driving forces in nature, society, technology, economy, and politics that influence the demands for water management in the river basin. The vision built in these projects is a specification of how the river basin needs to be (re) designed to be able to cope with the driving forces. Constraints for spatial planning, as it relates to water management, are explicated in these visions. Participants work with maps of the entire river basin to ensure that the different vision-building activities are carried out from a river basin perspective. The vision consists of (1) maps with indications for the future use of water and land for different nature, social and economic functions, (2) stories (or narratives) of possible future demands on the system, and (3) management principles for sustainable flood management, water distribution, water use, water treatment and administration.

3.2 Visions and dreams; a justification

The RIVER21 project challenges students to dream about the future. Why is it important that universities appeal to this ability of young people to dream, to envision a future that they would like to live in? This question can be answered from different angles.

First, many students understand intuitively that dreaming is an important quality in life, other students have trouble grasping the concept. Typically, formal educational programs for engineering do not appeal towards the development of visionary thinking. Schools for creative design like architecture or industrial design pay more attention to this aspect of personal and professional development. Nevertheless, the work of water managers

and engineers does contribute to the design of social and economical systems through planning and (re) designing of water systems. This design aspect of their work necessitates that students develop skills in long-term thinking and creative thinking. Students must be able to analyze a water system in terms of objectives (what social, economic and nature functions should be supported by the water system). They also must be able to find creative solutions to combine and strengthen these, often contradictory, objectives.

At the very start of the first RIVER21 project, the students met with Monsieur Bois, a white-haired man who spoke to them about the non-governmental, river-basin wide organization "l'Escaut vivant." He concluded his speech by asking them to dream and to live the promise that youth holds for the future. In subsequent meetings with representatives of Scheldt water authorities and NGO's the students have experienced that high expectations were being placed on their ability to think freely and creatively about the future. The International Conference on the Scheldt River Basin in 2000, but also the World Water Forum now recognize youth as a separate stakeholder that needs to be involved in the discussions on the future of water management (http://www. worldwaterforum.org). This development is the justification, if not obligation, for universities to pay attention to the student's ability to express his or her opinion about the future.

3.3 RIVER21 vision-building method

The goals of this vision-building exercise are educational goals. This is a strong contrast with the goals of scenario development and other future studies (Chapter 2). The results of the RIVER21 exercise consist of personal learning experiences as well as a more a tangible product, a booklet with the student's vision for the Scheldt river basin.

RIVER21 projects: Vision-building for river basins

Purpose By participating this exercise the team members *learn a future studies method* that values the contributions of a wide range of stakeholders in water management. Other goals are to gain experience in building a shared vision for a transboundary river basin; knowledge of a real-world situation in river basin management, the river Scheldt; understanding of the field of (political) tension between upstream and downstream nations; and to develop skills in communicating the value of a common vision for a transboundary river basin.

Vision-building team The vision-building team consists of 20-25 people. They represent the range of nationalities of the basin. The composition of the group allows for formation of subgroups that are international (all nations represented) and multi-disciplinary.

In the case of the university-based RIVER21 projects, participants were MSc students from universities in France, Flanders (Belgium), and the Netherlands. They had background in water management with

specializations in ecology, hydrology, civil engineering, agronomy, spatial planning, environmental sciences, or policy sciences. Participants work in small international and multi-disciplinary groups to conduct the problem analysis and subsequent activities in the vision building process. The results of this work in sub-groups are shared in a general assembly meeting each day.

In line with the Search Conference method (Chapter 2.6.4), the students take full responsibility for the communication process among themselves. The participants elect a group of three people to prepare the agenda for their general assembly meetings and to chair these meetings.

The participants work together every day during a two-week period, but also share living quarters and meals and leisure time. This gives the program a very intensive character, especially for participants who are not (yet) used to having discussions in a non-native language. On one hand, this so-called 'pressure-cooker' method leaves little time for research and reflection. On the other hand, participants cannot hold back since they are involved in all the analytic, creative, and production steps of the process.

A team of 4-5 university professors and instructors organizes the logistics and scheduling of activities for the entire project. They are present during the full assembly meetings to guide the process where necessary. Their influence is restricted to helping to bring out the knowledge that students bring to the group and to aid in structuring this knowledge. They do not interfere in the actual visioning-process or negotiations.

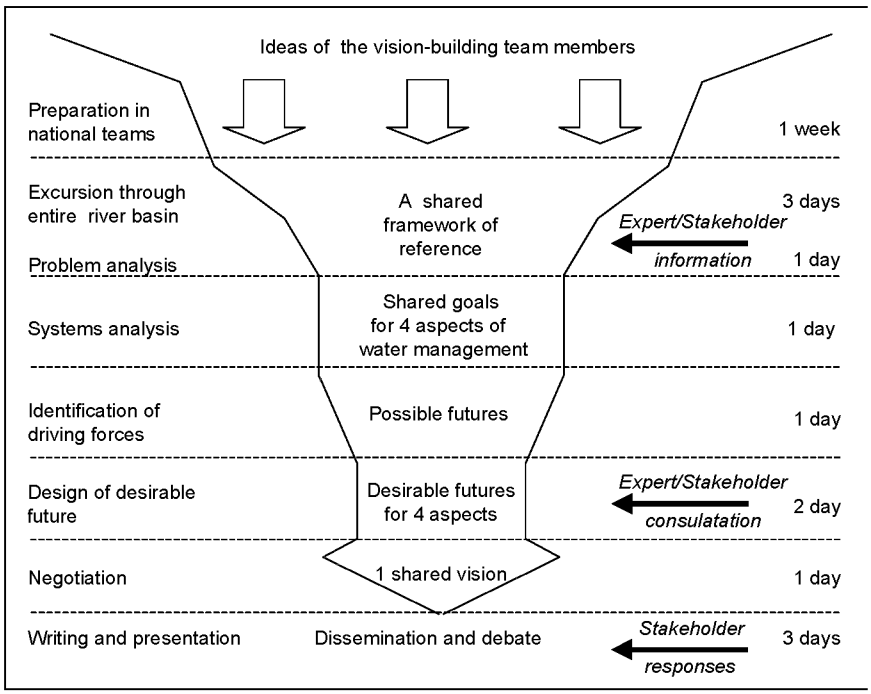


Figure 3.1: Sequence of activities in RIVER21 method

Vision building method (Figure 3.1.) starts with constructing a shared framework of reference: participants travel together through the river basin and work together on identification and understanding of the major (national) interests in river basin management. Systems analysis methods are used to understand the major issues with respect to cause and effects, as well as temporal and spatial aspects.

Once the problem analysis and systems analysis are completed, the participants are given a single assignment, namely to develop one shared vision for the future ("Leitbild"). The systems analysis can be used to discuss the preferred or desirable system performance. What objectives should be met in river basin management? A group that focuses on water supply in the basin can find objectives for water supply by asking the following questions and more. 'How much water should be available for drinking water preparation?' 'From what sources can it be prepared and against what costs?' 'What other interest should be met in the distribution of water resources when securing the drinking water supply to households.' 'What should the efficiency of the water supply system be?' Answers can be found by making use of the results of the previous discussions in which they came to a shared understanding of how the river basin functions:

Another step in the process is to explore the different possible futures that may enfold. Here, a scenario approach is followed, starting with the identification of the major driving forces (Chapter 2). Possible futures are discussed in terms of their undesirable and desirable characteristics. In this step the attention is shifted towards designing one desirable future. We have learned that the time constraints that we put on the process cause students to abandon the step by step approach (Figure 3.1). The attention if then focused on making maps of a river basin system that matches the goals for a desirable future, thereby aided by intuition and 'Leitbild' principles for sustainable water management.

The last step, coming to one shared vision based on the four separate visions that were made for the four themes, is not an easy step. In merging the four visions, contrary objectives must be solved. This step requires negotiation and time for reflection. A lack of time for reflection and consultation on the negotiations may jeopardize the outcome. Consultation with stakeholders may be useful in this step of the vision-building process.

Results of this exercise are, in the first place, a common language (vocabulary, causal diagrams, and maps) to discuss current problems and plausible futures. Other relevant results are the problem analyses and shared vision, as presented in a written report and discussed in seminars. These results are shared with interested water authorities in the river basin. (See Chapter 4 for the results of two RIVER21 projects that built a shared vision for management of the Scheldt river basin).

An important but less tangible result is the improvement of personal skills in communication in an international setting, creative thinking in multi-disciplinary groups, and presentation and argumentation of ideas. In conclusion can be said that the students in a very short time frame must play different roles: specialist or expert, analyst of the system, co-facilitator of

group processes, visionary thinker, and representative of one of the riparian states.

3.4 Role of stakeholder participation in vision-building

The vision-building team assembles information about the river basin in a number of ways. An important component of the process of gathering information is the consultation of experts and stakeholders, throughout the basin. Of course, expert and stakeholder knowledge can be solicited at all stages during the vision-building process but there are three important moments that consultation is imperative. First and foremost, it is important to meet with stakeholders the phase of building a shared framework of reference. Stakeholders represent specific relationships or dependencies between people and the river basin. Meetings with stakeholders should add not only information but also impressions about these relationships. It is preferable to have interviews and discussions with stakeholders in their own environment so that the vision-building team may be able to better understand the motivation and backgrounds of the stakeholder's opinion. That is why the method of an excursion is used.

The role of the stakeholders changes during the course of the vision-building exercise from giving input to the process to giving feedback on the products realized by the vision-building team. To this purpose, there are organized meetings with stakeholders who are asked to review the designs for a desirable future. At this stage, the vision-building team can still incorporate suggestions and correct mistakes or sources of misunderstanding. Finally, the shared vision is disseminated to stakeholders and the people they represent. This phase of the process aims at sharing the vision, its principles, and the vocabulary with a large public. The vision is the starting point for discussions but in this phase the vision is not adjusted anymore for new insights or information (see also section 2.5, the Mont Fleur scenarios).

3.5 RIVER21 concept: elements and process

The RIVER21 concept for vision building is a step-by-step process of activities. The sequence of the different activities is set because of the teaching purposes. Participants learn how the different activities are related to each other and recognize the flows of information. We know that in the real world this type of processes is not carried out linearly. Iterations of a sequence of activities and feedback loops of information may be needed to improve intermediary products and to secure support among the participants for the final product.

The RIVER21 concept for vision building consists of a series of activities (Figure 3.2). The process is fed by information from stakeholders, obtained by the vision-building team through written and oral communications with stakeholders and from literature. All activities have an analytical and a process objective. Output of a particular activity is the input for the next activity in the process sequence. For instance, a first understanding of the

problem analysis is the existing discrepancy between demand and supply of water resources. This understanding can be used to determine the scope and content of the systems analysis. The results of the individual activities can also be described in terms of process. For instance, it is important for the vision-building process that participants learn from each other; learn to work together to overcome confusion with regard to jargon and the use of a foreign language; find agreement on suitable working methods; and find ways to express and listen to the personal ideas of the problems in the river basin.

The individual steps of the vision-building process can be described as follows (see also Figure 3.2):

Problem analysis Participants start with an initial analysis of the problems. By definition, the problem analysis is to be written from a multi-stakeholder perspective. In the RIVER21 projects, the stakeholders are the riparian states in the river basin (as represented by the participants). Consequently, the level of problem analysis is that of the state level. The problem-analysis is directed towards problems that are of concern to public institutions. The nature of the problems is multi-disciplinary; a problem often has ecological, technical, administrative, judicial or economical components. The problem analysis pays attention to all of these aspects and to how they relate to each other. By definition, the problems examined all have a relationship to management of the water system. For instance, the issue of tourism development is stated in terms of the increasing pressure on existing drinking water supplies.

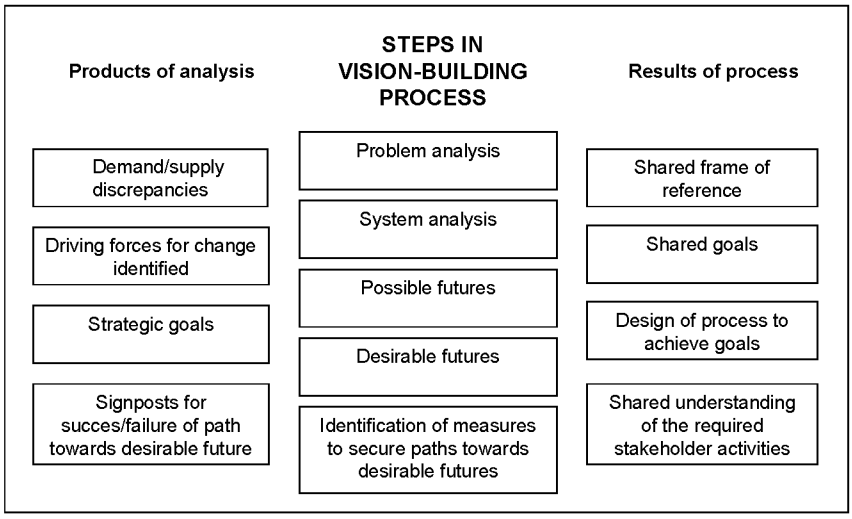


Figure 3.2 Overview of steps and products in a multi-stakeholder vision-building process.

The three questions "what, where, and when" are answered for all issues of concern. The spatial dimensions of a problem are visualized on large river basin maps. The temporal dimensions are discussed by sketching the extent of the problem in the present and future state. It is important that the

participants draw conclusions from the problem analysis phase. It can be very helpful to describe the issues of concern in terms of discrepancies between demand and supply of the water resources or of the services the water system performs for society and economy. Thinking in terms of demand and supply opens up the possibility to view conflicts in terms of competition for resources and solutions in terms of management of either the supply or the demand for water and water services (See also Figure 4.6).

Systems analysis The participants move from the initial problem analysis to systems analysis. First, the system boundaries are determined in relation to the issues the group is working on. It is common that the students first chose the demarcation of the watershed as the system boundaries. During the project, the participants may experience that the system boundaries have to be redrawn once they better understand the problems itself and the impacts of the forces that drive change in society (Verhallen et al. 2001). For instance, to include interbasin water transfers they have to expand the system boundaries beyond the watershed.

The participants are stimulated to draw cause-effect diagrams to map out the relation of the (problematic) system behavior. We ask participants to identify exogenous variables (belonging to the system environment and a system input that cannot be controlled by the system managers), steering variables or system inputs, and effect variables or system outputs (Thissen 2000). The participants also describe the relationships of these variables and interrelationships with other system variables. The diagrams that depict cause-effect relationships are used for a critical analysis of the issue of concern. This analysis may lead to further specification of the problems and generally leads to a better understanding of the variables that are critical to efforts to solve the problem. The identification of important effect variables is the first step in formulating a set of shared goals for river basin management. Again, we see here that the analytical process supports the collaborative process.

This exercise is important in finding common ground in the way the functioning of the river basin is understood. The process, and the desire to produce a single diagram that explains the group's understanding, requires that participants are explicit about their ideas of system functioning. This is an important step in the process because the participants discover the difficulties of interdisciplinary communication. A solution for "the tower of Babel" experience is found in asking each other to define the concepts and principles that are used during the discussions. "*Can you define what you mean with that?*" During the systems analysis phase, a start is being made with the development of a common vocabulary. The shared vocabulary and the shared insight in system structure and system vulnerability then become two important pillars of the shared framework of reference, next to the field experience of the excursion. (Figure 3.2)

Possible futures The systems analysis serves as a base for the exploration of possible futures. Indeed, the participants now have an understanding of which system variables are sensitive to changes in the system environment, and they are able to describe the impact of such changes in the system environment. The search for possible futures starts with a discussion of the concept of uncertainty and the relationship of uncertainty and time. Rosenhead's "trumpet of uncertainty" is presented together with the concept that possible futures may be characterized as more or less desirable based on knowledge about the extent in which river basin management objectives can be met (Figure 3.3). The concept of *predetermined elements* is introduced, so that participants can discriminate between presumably certain and uncertain developments and learn to question the assumptions on which such distinctions are made. An example of a predetermined element in scenarios for Europe was the introduction of the Euro as a common currency. We know that this is about to happen but we are still uncertain of all the effects this may have. Another predetermined element of interest can be the growth rate of a specific population. If the age structure of the current population is known, than much is determined about the future age composition and the potential size of the working class.

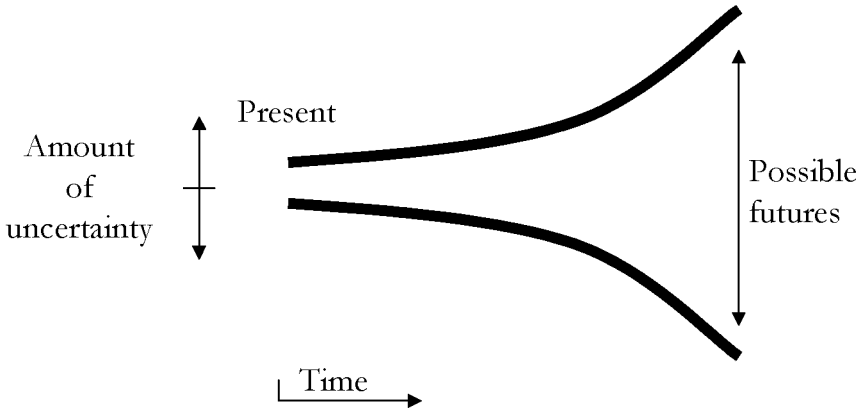


Figure 3.3. The trumpet of uncertainty
(adapted from Rosenhead 1989)

Participants are then asked to start the search for the so-called "driving forces" that contribute to the uncertainty about the future (See section 2.3). A system analysis (as performed in the previous step of this process) is in fact the preliminary step in exploring the vulnerability of the river basin to changes in society. Participants search for variables in the system environment that may be responsible for new trends or that may break existing trends. The impacts of such changes on the system are then assessed. What will happen if existing trends break? Will it be a change for the worse or for the better? What can be the consequences of new trends? All sources of possible change are searched: technology, economy, nature, politics, or the societal organization (Schwartz 1991).

The scenario development methods described by Schwartz (1991), van der Heijden (1996) and others (Chapter 2) are directed towards

identification of the most relevant forces that drive change in the system. These are extensive and time-consuming methods.

For educational purposes, as in the RIVER21 projects, it suffices to use an intensive procedure that focuses on scenario logic rather than on completeness of information as in professional studies. Enserink (2000) adopted Schwartz's step-wise scenario construction procedure into a time-intensive method for experts. This method succeeds in creating awareness of uncertainty about the future, stimulates creativity among participants, and serves as a means to get people involved in thinking about the future and taking responsibility for it.

The RIVER21 project therefore has adapted this method in the search for driving forces and important trends. Application of the Enserink approach to a future search is possible in RIVER21 projects because the problem analysis and system analysis steps have taken place earlier on in the program. At this stage in the process, participants have reached the level of understanding that is required to be able to construct scenarios.

Desirable futures Participants in the workshop are asked to formulate long-term goals for river basin management once they have analyzed the problem and identified a range of possible futures. At this point in the process the group shares the desire to solve current problems and to prevent the problems that they foresee for the future. It is unavoidable that participants start to think about strategies for solving current problems. However, we ask them to focus on goals for river basin management and not on solutions.

In doing this exercise with students we have seen that the formulation of a shared set of goals does a strong appeal on their leadership qualities. In fact, this is a very tough assignment for them as thinking in terms of goals (for integrated water management) is not something they have much experience with. We have found that some participants have trouble imagining in what sort of future society they would prefer to live. We have learned during the RIVER21 projects that, in order to formulate goals for river basin management, participants must be able to remember the principles for sustainable water management that they have learned in formal education, to express their dreams for a society that they would want to live in (section 3.2), as well as negotiate the opposed objectives and find common ground. It might be helpful to list as common goals the principles for sustainable water management that are recognized by the participants in this phase of the process. Other possibly helpful exercises are to list desirable characteristics as well as undesirable characteristics of a river system and the society within a river basin.

River basin management is very complex. For this reason we ask the vision-building team to work on different themes as described in the following paragraphs of section 3.6. The participants produce desirable futures for each theme and are then asked to merge these separate visions into one vision. In general there is little time for this step in the process, and this can have two effects. We have seen that the ideas and knowledge that have accumulated during the process can either converge in a creative manner

and lead to a shared vision (2000), or diverge once again in the final stages of the process (2001). We are not yet able to explain the decisive factor in being able to come to a single shared vision.

In section 3.1 we explained that the vision that is developed in RIVER21 projects is a design of the river basin, allocating socio-economic and nature functions to areas to the land, to the river and to its tributaries. The vision should be seen as (an attempt to develop) a policy scenario (section 2.3). At this point the vision building can stop if the exercise was set up for learning purposes mainly. Communication of the vision is obligatory, however, even when the vision was developed as part of an educational program. As explained below, the narration of the vision by participants enriches the process of vision-building as well as the learning experience (see also Chapter 6).

Measures, signposts for success and/or failure, and implementation process. Vision building is to be followed by action. Strategies to achieve the vision can be designed now that the goals for river basin management and directions for achieving these goals are agreed upon through the vision-building exercise. Strategies are sets of measures (or tactics) that change the system or the system value (see Figure 2.1). The process of strategy design, strategy choice, and implementation requires again stakeholder participation. In Chapter 6 we present ideas for organization of a strategic conversation aiming at the design of strategies for future river basin management. It is outside the scope of the RIVER21 method and this report, however, to comment on the organization of a participative process for action or the *implementation* of strategies.

A vision for infrastructure or spatial planning typically is projected for a long time period, say 30-50 years. During such a time period the system environment can change significantly. The insight in the important driving forces and the impacts they may have on the system can be used to select a set of variables that may act as signposts, indicating if the future enfolds as envisioned or not. In the latter case, the implementation of the vision may require that a strategy or an individual measure be adjusted to the new circumstances. Two examples of potential sign posts for the future of a river basin are the recharge rate of a groundwater reservoir (indicator for the success of groundwater saving policies and need for treatment plants that prepare drinking water from surface water) or the changes in crop pattern (indicator for a possible change in erosion rates and future need for dredging in canals).

Communicating the vision is an integral part of the vision-building process. This is not only true during the process but especially once the vision is completed. The target group for communication is the group of stakeholders involved in river basin management. Since the vision of RIVER21 projects encompasses the entire river basin, stakeholders are to be sought at the river basin scale and national scale.

As stated earlier (3.4), the purpose of the RIVER21 projects is to get acquainted with the process of vision building and to learn skills that are needed to be able to make a contribution to vision-building. The contact with stakeholders is very important for the participants because (1) it confronts them with perspectives on the river basin and its management different from their own; (2) it challenges them to communicate about these differences and deal with them, (3) the challenge of dealing with conflicting and opposing perspectives becomes real in the contact with stakeholders, cannot be ignored and asks for answers that can be justified to the stakeholders; (4) it gives them an opportunity to narrate stories about the future.

We learned by experience during the RIVER21 projects that narration, story-telling is a very important instrument to enlarge the extent in which a vision about the future is shared. Narration took place in different forms, at different times. Students gave oral reports at the end of each day, sketching the progress they made in understanding of the system and its possible futures. Also, oral and written reports were prepared and presented to interested stakeholders. The stress on narration, on sharing of insights and ideas, was instrumental in the development of a shared vocabulary. The vision-building team selected and modified its vocabulary during all the moments that stories were shared. At the end of the project participants had internalized this vocabulary and were all able to present the vision. Contact with stakeholders, in all phases of the vision-building method, influences the selection of the proper wording for sharing opinions about the present and desired future state of the river basin. This contact enriches the vocabulary used by the vision-building team and enables the sharing of the vision with stakeholders in the final stages of the process.

3.6 Division of work: 4 working themes in RIVER21 project

In the RIVER21 projects we try to work in small groups, consisting of 6-8 people, representing the three countries of the Scheldt river basin and the different disciplines brought in from the different universities. The groups are being given the same assignments throughout the project but work with different themes. We have tried out two types of themes. In 2000, the themes had a disciplinary but basin-wide character, linking the upstream to the downstream regions. These themes were each a chain of system elements and processes that can be influenced by human actions:

- precipitation and erosion >> discharge of water and eroded materials >> sedimentation;
- ecological corridor and river continuum;
- groundwater and surface water resources >> drinking water usage>> sewage production>> treated effluent;
- dispatchment of goods from port >> transport by water way >> reception in port >> transfer.

In 2001, we tried a different approach to explore how the visions may differ if the themes of the working groups were (a) more tightly linked to the human than to the physical system of the river basin, and (b) perhaps more easily to quantify. The themes that the vision building team chose were:

- safety;
- water availability;
- ecology;
- economic development.

In both cases the participants were able to work with the two sets of themes. Starting from the point of view of the societal themes (2001) required different skills than working with physical chain concepts (2000). The societal themes required that the participants were able to operationalize the themes in relation to water management; the chain concepts posed high demands on the conceptual modeling skills. The societal themes created many opportunities and needs for interdisciplinary work. However, the problems with operationalization stood in the way of a more quantitative approach. The use of the chain concept required a lot of time and discussions in groups that were not similarly trained in the use of visualization of concepts and conceptual models.

3.7 Program for a workshops using the RIVER21 concept

Figure 3.4 shows the actual scheduling of the first RIVER21 workshop. The scheduling of the second workshop was a little different. The timing of the workshop was determined by the academic schedule of the universities and coincided with "European week," a typical time for student-exchange programs in the European Union. The preparations include a briefing by the national water authority; at the end of the program the participants report back to this or another water management authority to present and defend their vision on river basin management.

The daily program of a RIVER21 project can be organized according to the needs of the participants and supporting staff and the facilities available. Text books on search conferences (e.g. Emery and Purser, 1996) are good sources for practical ideas and principles for day to day organization of the vision-building process. We have found it beneficiary to the process to start and end the day in a general assembly of participants. The supporting staff explained the program and tasks at the beginning of the day. When needed, a lecture was given to explain the assignment or activity. Participants worked in groups and in separate rooms for 4-6 hours each day. At the end of each day, all participants met and shared their results through short presentations and discussion. The participants had access to computers all day and used these to write texts, draw maps, and to make electronic presentations of their work. These products were then made accessible for all participants through the use of internet-based software.

Table 3.1 A program of a RIVER21 project

Preparation	Jan-March	Independent study of the Scheldt river basin
Excursion	March 9-12	Three days travel by bus and boat through the entire river basin.
Introduction	March 13	Presentations of national perceptions. Sharing ideas about importance of vision-building
Systems analysis	March 14-15	Identification of problems, goals, and driving forces for 4 different issues/themes in river management
Vision description	March 16	Description of desirable futures. Building of shared vision. Preparation of group presentation
Consulting stakeholders	March 19	1,5-hour presentation of the vision and vision-building method to stakeholders. Receiving feedback from stakeholders
Report/ evaluation	March 20-22	Writing of report. Evaluation
Sharing the vision	March 23	Report of the vision and action program by the delegations to representatives of the national government

4

Analysis of student's vision for management of the Scheldt river basin

The RIVER21 students produced two visions, one in 2000 and one in 2001. These products were analyzed for each of the different steps in the vision-building as described in Chapter 3 and in Fig. 3.2. This analysis illustrates the RIVER21 vision-building process. In presenting the student products we also are able to show some of their perceptions of the current state of affairs in the river basin, their innovative ideas, and the solutions that they have found to integrate the different goals for the management of the Scheldt river basin.

4.1 Introduction

In Chapter 3 the method used in the two vision-building exercises was described. Here the results are laid out for the reader. In the problem analysis phase students and staff travelled in three days from the source of the Scheldt in Northern France, through Walloon and Flanders to the estuary of the river in the Netherlands. During the problem analysis phase, students spoke with different stakeholders about their concerns and desires. Questions as: what problems, whose problems and on what spatial and temporal scale do they exist, could be answered after this period and mapped on charts (Fig. 4.1 - 4.3). The system analysis phase is meant to get a grip on the necessary system boundary (ies), the way the system behaves and is a base for the search of possible futures.

4.2 National issues of concern

A staff member stated the importance of having the students investigate the concerns at the national level:

> *"We encouraged them to meet the stakeholders at the national level. The students were asked to collect data concerning the present state of the basin and to analyse the national interests. By doing this, they became aware of discrepancies, contradictions and risks their own country has to deal with, and they took these issues at heart. Meanwhile they became*

convinced they had to promote some key points for their own country. We did not manage to harmonise the preparation phase as far as we first wanted. Some delegations had more time than others and got more supports from the national committed institutions. Nevertheless the disagreements between each country and the stakes in presence were well enlightened by every delegation"

(From the RIVER21 2000 report)

The students indeed used the preparatory phase of the project to analyse the national concerns of their country or state. They obtained information from policy documents and interviews with national and regional authorities or stakeholders. In the beginning of the course these stakes were presented by the students from the different countries.

France

The main French concerns are on water quality, groundwater resources and economic development of the region. The water quality is linked with the amount of pollution and as a consequence also with the land use. In the French part, agriculture is essentially based on cultivated lands, leading to a release of nitrates and pesticides in the environment (soils). Agriculture in Flanders and Dutch parts of the basin are essentially based on breeding of cattle, which leads also to a high amount of pollution on water resources. The water quality is further affected by the high concentration of industries, which leads to polluted discharge. The water treatment capacity is said to be high in France but not so high in other parts of the river basin (Brussels region).

This sets the problem of the *sustainability* of the groundwater resources from a quality and quantity point of view. For France this is an important issue because 96 % of *the drinking water* consumed in Region Nord Pas de Calais is depending on already over abstracted aquifers. Until now due to the still bad quality of the surface water there is not an alternative for the use of groundwater. If the pollution increases, it could set a problem concerning the availability of safe groundwater for the human consumption. The French stress that already considerable dependency exists of *transfers of water* from other basins. They think it is very important to co-operate between countries to preserve the groundwater resources.

Historical the inland shipping in the French part was not so important. Since 1991 there is a shipping authority (VNF) that is in charge of the functioning of the canals. There is a problem of silting up of the canals.

The unemployment rate in Region Nord Pas de Calais is 15 %. Since the crisis of certain industries, like mining, new types of industries are developing. In particular, the services are becoming the key sector. The economic development benefits from the developed transportation networks. These networks need to be developed further in order to improve the economic development of the region in the future. This is a key point to attract new industries, create new activities and reduce the unemployment rate. As they

see it tourism is also an important possibility. But that is particularly based on the attractiveness of the natural areas, if they can be preserved.

Belgium

In the Belgian presentation of the concerns the Flemish perspective is more outspoken due to the fact that no contacts had yet been made with Walloon and Brussels.

The Flemish interests on the Scheldt river basin are the water availability and poor water quality, the ecological development of the water system and the accessibility of the harbour of Antwerp. They stress the need to overcome the fragmented administration and a need for efficient policy development.

The water *quality* has to reach a minimal level and the water *quantity* has to be well controlled. There always has to be a minimal amount of water for drinking water purposes, for ship traffic on the Upper Scheldt and for the overall water management (for instance prevention of groundwater- and salt intrusion in Terneuzen). The control of floodwaters is important for the safety of the dikes and canals. They state the importance of the tributaries for the discharges in the main river, the sediment transport and pollution they bring along. Attention to the tributaries is essentially in order to have a *management of the whole basin.*

Flanders stresses the need for the development of an *ecological water system:* environment friendly design policy and re-configuration of existing river reaches in order to have a river continuum approach (river channel + banks + plains + direct surroundings).

Deepening of the Westernscheldt may be needed for the development of the harbour of Antwerp in confrontation with harbours in Zeebrugge, Dunkerque and Rotterdam. The dredged material needs an appropriate treatment to fit in the concern of a total nature development of the harbour area and the Scheldt-estuary.

The Netherlands

The Dutch perspectives on the Scheldt river basin are based on the following key issues. The Netherlands wants to keep the unique character of the estuary of the Scheldt. This means improvement of water quality, bird-breeding sites, sediment quality and keeping the freshwater – saltwater gradient the same. They stress the importance of the estuarine area for recreation, which is why they want a policy of safety against flooding and calamities coming from ships with dangerous loads.

Especially the area on the north side of the estuary has a weak economic position, but could be an area with a cultural history that is interesting for tourism from the Antwerp region and for the Dutch.

They want to implement a uniform and integrated monitoring- and warning system on the whole river basin so that the data can be exchanged and that the fight against pollution and inundation's can be more efficient. Further

interests include industry and keeping Rotterdam's position as international harbour in mind.

Good neighbour relations with the other countries in the basin are found important. That is why they wish to expand the ICBS-mandate with water quantity, safety and economical issues.

4.3 Problem analysis: integration of national concerns into river basin-wide issues

In the first days of the course the international groups decided on which were the main issues/problems that should be addressed in the vision. These are collected in Table 4.1, which is a composite of the results for 2000 and 2001. The issues are described as to the problematic behaviour of the system, the possible causes, and spatial distribution and in general ideas about how to deal with them.

In composing such lists, the students integrated the issues mentioned by the respective countries and, in fact, allowed the administrative boudaries in the basin to disappear in their analysis. One could say that they appropriated the problems in the entire basin as the problems they wanted to deal with. One could say that they they implemented a transboundary river basin approach. The other advantages of composing such lists were the shaping of a shared framework of perspective and the integration of issues related to water management, ecology and economy.

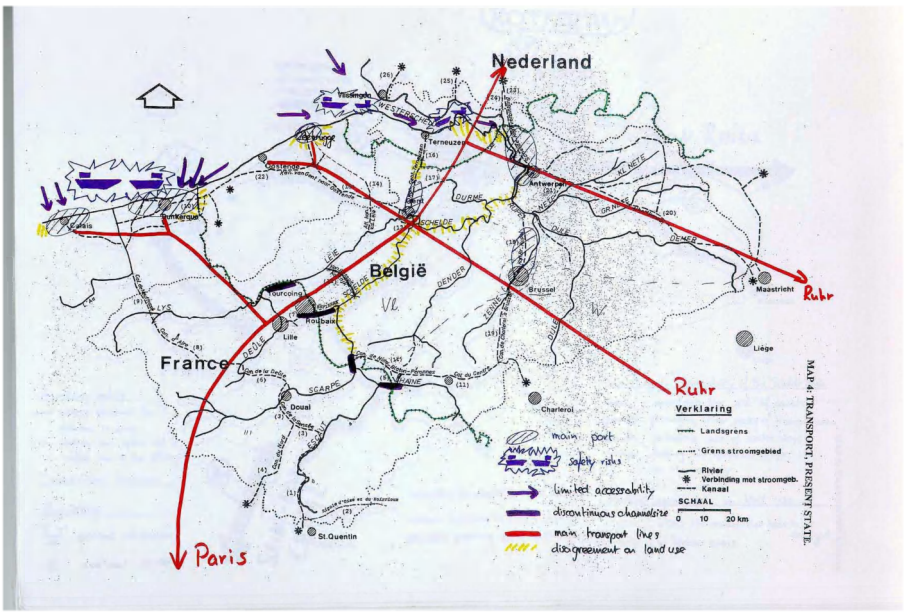


Figure 4.1 Student map of present state of transportation in the Scheldt river basin (prepared on A3-map)

'To integrate all stakes and uses withing a river basin is a challenge. The stakeholders are framed by their constraints and interests and can hardly take into accoutn other issues. To work with students is easier because their commitment with the real world is less. Students often do not realize why the stakeholders are so short-sighted and reluctant to co-operate."

(from the RIVER21 report 2000)

For illustration, the students drew A3-sized maps with the present state to visualize the spatial coverage of the problems in the basin. Fig. 4.1 gives an impression of one these maps, depicting the present state of the transportation in the basin. The exercise of mapping problems on river basin maps is another aid in the implementation of the river basin appraoch. Other examples of maps depicting the present state of the ecological corridor, water use, sedimentation and flooding problems can be found in the RIVER21 reports of 2000 and 2001.

Table 4.1 Scheldt river basin problem analysis (2000-2001)

Problems	**Cause**	**Where**	**How to deal in general**
Not enough safe drinking water for all inhabitants	Aquifer volume depleted, quality of surface water insufficient	Upstream	Demand management, cleaning surface water
Tourism in coastal area demands transfer of water from the basin	Drinking water supply is limited there	Coastal area	Demand management
Agricultural diffuse pollution/erosion is significant	Management practices due to competition, ignorance and lack of enforcement?	Upstream erosion/downstream sedimentation of pollution	
Household pollution is not treated	Not enough sewage treatment facilities	Brussels and around Antwerp	Investments policy
Ecological habitats disappears	Pollution, hydraulic structures, dredging	Along the canals, tributaries, estuary	Function diversity, clearance of obstacles, more flooding area's, innovation of way of dredging

Table 4.1 Continued...

Problems	Cause	Where	How to deal in general
Ecological connectivity is distorted	Loss of wetlands		Restoration, different land use
Ecological disturbances	Fishing, hunting, ships	Upstream and midstream	Zoning?
Flooding risks	Loss of volume to be flooded	Sea Scheldt, around Gent, estuary	Enlarge flood volumes
Risk of calamities by dangerous shiploads for inhabitants along the estuary	Increasing size of ships, certain industry in Antwerp	Estuary	Precautions, restrictions
Deepening of the access channel to Antwerp is disputed	Antwerp harbour wants to accommodate bigger vessels for competition reasons	Flooding risks in Sea Scheldt and loss of biodiversity in estuary	European legislation to limit growth; cooperation of European harbours
Inland navigation hampers other uses in the basin	Navigation channels need hydraulic structures, water depth, width	Upstream and midstream	Function diversification, limit to inland ship size, more co-operation among countries
Economic development is unevenly distributed in the basin	Potentials differ, new activities are needed because of loss (mining)		Encouraging tourism, if in an attractive aquatic and cultural environment
Dense infrastructure: roads, water ways, rail	The basin lies in a central part of Europe, many entrances from sea	Around big cities	Spatial planning on basin scale
There is no river basin authority	National policies, sovereignty, bilateral contacts	Whole basin	EU Water Framework Directive?

Table 4.1 Continued..

Problems	Cause	Where	How to deal in general
There is no uniform water legislation in the basin	Subsidiarity principle	Whole basin	EU Water Framework Directive?
The Belgium federation has no national perspective on RBM	Fragmented administration		EU Water Framework Directive?
Decisions on spatial issues have long term impact on basin	Whole basin	RBM should be related to spatial Planning	

4.4 Systems analysis: system boundaries and system structure

In chapter 3.5 the systems analysis part was described. It means a systematic exploration of the problematic situations. Going from the problem analysis to the system analysis is not easy. Are we studying the whole basin? Is there a need to change the system boundaries in relation to the issues we are working on? Are we sure that we all have the same ideas about the system elements and structure?

System boundaries In the beginning the basin of the river Scheldt is the geographical boundary for the Vision project. But depending on the themes/issues students were working on, a group could decide to limit or expand the system boundaries. An example: for the theme Water Distribution two possible boundaries were drawn in 2000 and in 2001 (Fig. 4.5): the Scheldt watershed boundaries and boundaries that included the watershed, the coastal area and a coastal water mile. The search for possible solutions is rather different in both approaches as the mismatching of demand and supply is solved within the system limits, disregarding the water demand of summer tourists when the watershed delimits the system. In both approaches, however, interbasin transfers of groundwater and surface water to and from the Meuse and other watersheds are not being recognized.

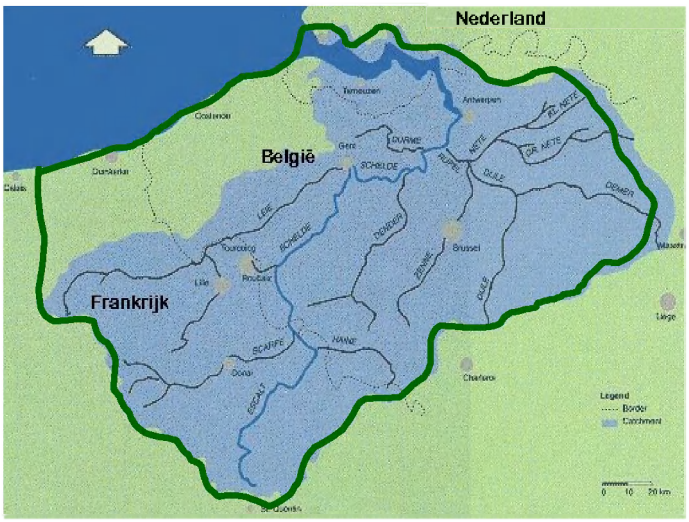


Figure 4.5 System boundaries shift to match the issue of concern: drinking water.

System elements and system structure A river basin can be conceptualized as as a natural system that interacts with the human system (Fig. 4.6). The biotic and abiotic descriptors (in the boxes with dotted lines) represent the natural system as the potential supplier of water in a certain quantity, quality at a certain place at a certain time, but also as a supplier of biodiversity and physical structure. The human system manages or interferes with the natural system through demands for water, biodiversity and physical structures.

The thick-lined boxes on the right side relate to management objectives. This can be done by the instruments shown on the right side (in the double lined boxes) and by influencing the social and economic activities in the institutions with the associations and interests groups. Between the demand and the supply side (see the normal lined boxes) divers actions/measures are needed (like water treatment) to match both. As for the proper monitoring of the management activities good information management is very important and can also be seen as matching supply and demand of information.

Figure 4.6 Conceptual model of the human and the natural systems of a river basin.

4.5 Desirable futures and shared goals: visions for the Scheldt basin

We present the final, overall visions of the students of 2000 and 2001 are given, as much as possible in their own words.

4.5.1 Vision of students in 2000

From the list of problems (Table 4.1) the students choose to formulate their challenge as follows:

> *"The challenge in building an overall vision for the Scheldt river basin is to find long term solutions for transportation problems, economical development and social demands without disabling the functioning of the ecosystem"*

The vision that was built in March 2000 had a 30 year prospective and contained the following elements:

Specialisation of different harbours. The different harbours within and outside of the river basin specialise their shipping activities to keep maritime navigation in the Scheldt area within acceptable ecological and safety boundaries. Rotterdam continues to handle the large oil tankers while Antwerp directs their infrastructure on handling smaller ships. To prevent high risks of calamities inside the estuary, dangerous loads are sent to Zeebrugge. This specialisation is agreed upon through communication and negotiations between the harbours on the Le Havre-Hamburg axis.

Functional differentiation of rivers/tributaries. For accessibility of the hinterland by inland shipping and also to foresee in a dynamic ecological structure, a functional differentiation between rivers is established. Rivers along the main transport axes have a transport function, while other sub-basins are returned to a more natural structure (e.g. meandering, floodplains, tidal flats) and facilitate proper functioning of the ecosystem. Surroundings of waterways are nevertheless restored to promote leisure activities (jogging, cycling) in order to satisfy the urban demands for green areas. The preservation of the water quality of smaller, more natural tributaries allows drinking water production out of surface water and prevents overexploitation of groundwater resources.

Balancing supply and demand. Water supply and water uses are balanced in the river basin between socio-economic activities and nature by both lowering water consumption and enhancing infiltration. Water consumption is managed through pricing policy, which fosters domestic water reuse and promotes total industrial recycling. Industrial and urbanised zones have improved and expanded their wastewater treatment. Effluent and water quality standards are based on a common, standard monitoring system of

biodiversity (through biotic index), water quality and quantity for the whole river basin. Infiltration is enhanced by a new agricultural policy, which reduces subsidies to intensive production and prevents pollution at the source. Subsidies are given to help prevent erosion from fallow land by maintenance of hedges, special ploughing methods and cultivation of winter crops.

Spatial planning. A framework for spatial planning in the river basin has been established, because "every land-use decision is a water management decision". Land-use decisions typically meet short-term demands but may harm long-term interests because they change the physical, chemical and ecological characteristics of the river basin (ASCE, 1998). In this respect, certain ratios of agricultural and built-up surfaced areas are defined by the cooperating Administrations to control sediment mobility and flood propagation and to promote a natural development of the aquatic ecosystem.

4.5.2 Vision of students in 2001

The vision that was built in 2001 differed from the vision that students produced in 2000. In 2001, the students provided a 100-year prospective:

> *"We want to advocate an Environmentally APT future. That is a future in which the pressure imposed to the natural Environment is managed with regards to Affluence, Population and Technology, where affluence is a variable depending on the standard of living and the ability to fit in the natural environment".*

The overall objective of this vision is to have a high quality of life in the Scheldt river basin. The long-term vision we propose is based on a sustainable development that is related to environmental upgrading. This improvement is aimed at both human beings and their natural environment. For human beings, the sustainable quality of life that is desired implies a balance between technological comfort and ecological quality. It is hence believed that a restored and varied natural habitat is a major element for people's welfare. The increased importance of the natural environment in our desired future will result from a highly developed technology guided by strong environmental principles.

The year 2100 should be seen from a European perspective. Management of economy, technology and agriculture has been shifted from national authorities to the level of the European Union. For implementing European environmental law, the river basin is seen as the most appropriate level. In this line of thought the ICBS / CIPE (International Commission for the Protection of the Scheldt) has become an important body for transferring and imposing law to the river basin of the Scheldt.

Main elements of this 100-year prospective are:

Assessment of total environmental impact. The process leading to such a situation must respect individual freedom at all times. The implementation of an environmental dogma is obviously rejected. It is desirable to include the assessment of total environmental impact in our culture, i.e. understanding what effects our actions have on the natural environment and use this understanding as a decision criterion at all levels. How can we make sure this way of thinking is adopted and shared as a common value? We tend to think about using the principle of full cost recovery: translating environmental impacts into monetary costs. But we wish that this sort of policy were not necessary or not crucial for the success of our vision. We want to reach a point where comprehending these environmental impacts, guides the behaviour of individuals and legal entities, so that enforcement is no longer necessary".

Ecology. In the year 2100, the Scheldt basin looks different, with a significant improvement of ecology. First of all, the water balance within the river basin is closed. Hundred years ago, water that was let into the Scheldt river basin was interacting with other river basins. Nowadays, the European policy states that a river basin should be independent from others. No water passes the catchment's boundaries to fulfil needs. The canals that were once used for transporting water from one river basin to another are nowadays only used for transport, with a minimal exchange of water. Secondly, water is used in a sustainable way. It is re-used as much as possible within the technological possibilities. To sustain groundwater-aquifers, required water is subtracted from surface water. Water quality has improved, because all the hazardous discharges are stopped and only that amount of pollution is released into the system, which can be dealt with by the ecosystem. Migration of organisms throughout the basin is now possible. All the structures, which made it difficult for species to migrate, are removed or there are facilities for the migration of organisms. There are no more exotic organisms introduced in the basin. The different species find a beautiful habitat in natural riverbanks. These riverbanks are a source of life.

Important role for river basin commission. For the Scheldt basin, the ICBS / CIPE has full authority over the management of the water system and spatial planning within the river basin. Because the water system is the base for the accommodation of activities, spatial planning is on the scale of the river basin and not local. Also the ICBS / CIPE has an important role in involving the public in decision-making, and in awareness of effective use of water.

Spatial planning. Regarding spatial planning, human activities are nowadays concentrated in nodes, which are connected by corridors, the remaining countryside has an open character and looks very natural.

Flood protection. The sea level has risen over the past 100 years and therefore people assigned more areas for flood-storage. Because of the changed precipitation pattern within the year, it rains more in winter and less in summer. The land-use is adapted to cope with these changes. There are more infiltration-areas in the countryside, which store the high peaks from the winter to be used in the summer. Also the erosion is decreased through better land-use practices such as crop planning and buffers along the ditches.

Agriculture. The intensive agriculture of the 20th century does not exist anymore. The land is used extensively but the profits per crop are high, thanks to new technological developments. Use of artificial fertilisers and pesticides is not necessary any more. Crops are adapted in a way that they are resistant to diseases. The amount of natural fertiliser (manure) is perfectly adjusted to the needs of the plant. Because of high environmental costs and water-use for producing meat, consumption has diminished to a minimum.

Economic sectors co-operating. There are international agreements on co-operation between different sectors and ports, which were competing 100 years ago. The harbour of Antwerp is the main port of Belgium and is the big spider in the web of the Scheldt river basin. For the transport on the river itself, the ICBS / CIPE has agreed not to adjust the Upper Scheldt to accommodate larger inland transport vessel. Deepening of the Westerscheldt has stopped as a maximum size for shipshs been agreed upon. Though, maintenance dredging is still necessary.

5

Value of future studies for the implementation of the European Water Framework Directive

In this chapter a relation is laid between the objectives of the European Water Framework Directive and the planning activities that are needed to reach these objectives (5.2) and the value of scenario development and vision building for the implementation of the EU- WFD (5.3). This raises the question of how the coordination of these activities will be addressed in a transboundary river basin district (5.4). In paragraph 5.5 the need for appropriate capacity building is discussed in order to start and maintain the river basin management planning process together with the different parties in the basin (public participation).

5.1 Objectives of the Water Framework Directive and planning activities

The overall objective of the EU Water Framework Directive is to come to integrated water management on a river basin (district) management scale. A river basin management plan is an important tool for that. However such a plan is the finalisation of an even more important process, in which systematic exploration of a strategy should occur with important actors.

The environmental objectives as stated in the EU-WFD have to be applied to all waters (integration of ground- and surface water, integration inland, transitional and coastal waters and to all areas that are to be protected because of their specific habitats and species). Next to that the integration must lead to the environmental objectives formulated in Article 4 of this framework (EU, 2000). This article states that measures taken specified in the River Basin Management Plan (RBMP) must lead to protection, enhancing and restoring all these waters mentioned to a level of good or potential good ecological water status (described in Annex V). Activities of sustainability programs like Agenda 21 that are related to water could be integrated in the RBMP process for the Water Framework Directive.

To be able to do that, all environmental legislation should be applied in an integrated manner and expertise from a broad range of disciplines is needed to get an integrated approach. So all actors that hold a stake or interest in the basin should be able to bring in their knowledge, means and support. Important decisions as where to spend the money on and who should pay should at the least be shared between these stakeholders and the responsible authorities. It is to be expected that in order to reach the environmental objectives there is a strong need to combine resources in the most cost-effective way (Strosser, 2001). By the way of Article 5 (Review of the environmental impact of human activity and economic analysis of water use) and Article 9 (Recovery of costs for water services) the relation between ecology and economy is strongly laid in the Framework Directive.

As a consequence of the choice for river basins as unit of management, the planning is closely related to other policy fields as spatial planning, agricultural policy, transport and harbour policies, economic development policies, whether they are national or European based policies. That is why it is essential to know what the main basin perspective is for the future is and where planning cooperation must be sought outside the area of jurisdiction of a basin coordinating body. This can be addressed by communicating the constraints for the basin policy, within which the solution, at the other policy fields mentioned, should be sought (Verhallen et al, 2001).

When we speak about an International River Basin (district) the above mentioned integration needs are even more challenging to reach. One can use a very pessimistic scenario: every competent local, regional, national and international authority develops their own analysis and plan for their territorial part of the basin (so called stapling of plans). In that way the up scaling is difficult and maybe very frustrating and time consuming. Another effect can be that only sub-optimal solutions are in reach.

An alternative for that is to plan the work in a more integrated way but with respect to the different competencies (see Chapters 3 and 4). By doing so the scale of analysis and intervention (the system boundary) is larger and the range of possible solutions can be broader. At the same time the pool of expertise to draw upon maybe also much bigger.

The implementation time for the EU-WFD is short, the different authorities have for sure taken their measures to start with the preparations within their competences and responsibilities. Still, we argue here that there is need to start a coordination process. In Chapter 2, 6, and 7 several suggestions are made. If parties are convinced that starting together is valuable it should be carefully planned.

The objective should be to come to an effective and transparent policy development process where river basin plans systematically are used for assessing relevance of structural policies and a basis for sector policy reform (Strosser, 2001). In Article 14 on Public information and consultation it is stated that the active involvement of all interested parties in the

implementation and in particular in the production, review and updating of the river basin management plans shall be encouraged.

Table 5.1 reflects the tasks each member state has to fulfil to comply with the procedures of the WFD. Certainly at the basis of that is a system analysis of the functioning of the basin and a visualization of the features in this basin. When we look at the tasks mentioned as "the significant issues, the economic analysis and the production of a RBM plan, it is clear that interested and affected parties that have information, opinions and means must be brought to the table. Expertise must be sought on predictive capability, economic expertise and statistical power analysis for example.

Table 5.1 Time steps towards reaching the EU-WFD requirements

Timetable	Task	Remarks
2004	Review of environmental impact of human activity and economic analysis of water use (Art. 5)	Spatial representation in maps etc. Gives an opportunity to come to a common representation of the basin (same picture)
2004	Register of protected areas	Idem
2005	Identification of water abstractions for drinking water and impoundments	Inventory, monitoring of the quantity and protection of quality
2006	Significant water management issues established	Who decides what is significant?
2009	Publication of first RBM plan	Public access to the background documents
2010	Apply principle of recovery of costs for water services	A fair contribution must be made by various uses (industry, households, agriculture) to full recovery of costs
2012	Combined approach of point and diffuse sources	Emission control and best environmental practices
2015	Report on achievement of objectives	If a gap a plea fro derogation

5.2 Value of future studies for Water Framework activities

As is stated in Chapter 2, a strategic conversation with the interested parties is important during the whole process, but especially in the pre-planning phase this conversation is crucial. We conclude that the fundament of the work lies in the analysis of the functioning of the water system, producing

consumptive and non-consumptive goods, in relation with the human use(s). What are the problems; on what time scale and spatial scale do they occur. Which of these problems should be addressed in this framework. To know what possible measures can help to reach the environmental objectives, expert knowledge is needed on causal relationships. Certain steps to come to a river basin management plan can be distinguished (Table 5.2):

Table 5.2 Steps towards a river basin management as required in the EU-WFD

Step	Task for EU-WFD	Methodology	Outcome
1	Assessment of the present state of the river basin	Problem analysis from stakeholder perspective; supported by analysis of river basin system	Shared frame of reference of the characteristics and human impacts of/on the basin
2	(Inter) national concerns and EU-objectives for 2015	Inventory of issues and objectives	Local & (inter) national issues and related goals for management plan
3	Preparation phase	Systems analysis to link actions to release impacts to ultimo reaching of objectives.	Shared understanding of the functioning of the basin, the relation between issues and objectives and means to address these, including an expected timeframe.
4	Possible paths to get there	Identification of measures to secure path towards desirable future	Transparent discussion about effectiveness of measures (how, when, where),total costs and selection.
5	River basin management plan with plan of measures	From vision to action: designing an implementation strategy	Concerted implementation: partnerships, co-financing etc.

Table 5.1 shows that the time horizon to process a river basin management plan is 2009 and the target to fulfil the objectives of the framework is 2015. This can be seen as a planning process with a limited timeframe. For sure a larger time horizon is needed when we look at implications of the EU-WFD to other related policy fields as the Common Agriculture Policy (CAP), the Spatial Planning policy and the Regional Economical Policy in Europe.

For the planning horizon of 2015 and further it is very useful to investigate the driving forces that influences the functioning of the system or changes the effects of the system (like a strong population growth drives a

larger demand of water causing a upward trend unless special attention is paid to a more sustainable efficient use). To discuss ways to respond on these driving forces and yet be able to meet the long-term objectives an exploration of scenarios and the development of a common vision is a very useful tool, as was stated in chapter 2,3,4). This may lead the way to, let's say, leading principles or best practices that can be followed. When expressing a common vision about how to reach the WFD objectives, it is also a communication tool to other planning platforms or to the (inter) national political level.

5.3 Coordination of vision building and/or scenario development in river basins

Cultural and political differences in the Scheldt basin are big (Santbergen, 2001). Experiences in the ICBS/CIPE, but also in bilateral forums, lead to a conclusion that it takes time to overcome these differences. But there is a great risk at stake when these differences are not properly adressed.

The process of implementing the European Water Framework Directive creates opportunities. Other Member States and accessing countries have started an innovative process with much enthusiasm. If an integrated planning process is not started it may well be that a certain sector or a sovereign riparian state sets objectives that are not in the interest of others in the basin. Can (sub) basin committees be formed that have a certain integrative planning power and possibilities to finance activities and control implementation? It can be of help to know that all European Member States struggle with the same process, and there are thus opportunities to learn from each other.

5.5 Capacity building

As mentioned in the paragraphs before, the implementation process of the EU-WFD has a need for people capable to do the tasks mentioned. Capacity building of the people involved is required to be able to steer the institutional cooperation, to have experience or knowledge of integrated water management practices, the river basin approach, the relation between ecology and economy, and the way to involve the stakeholders in the process. Who are these people involved? They are the members of a river basin commission and members of their working groups; regional authorities; private partners, from economic sectors or from the environmental and nature related NGO's needed to exert plans and projects; citizens (youth and other age groups), who are affected and want to be involved; engineers or water managers still in training; A great effort of all interested parties is needed to develop a "Leitbild Scheldt" and make that in the future reality. People are needed that have a broad scope and are able to communicate with different disciplines, different opinions.

Capacity building can be done on the job: starting a process that leads to a common developed integrated river basin management plan and carefully facilitated. The fruits of this process can be much larger then the paper plan itself!

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> *"…We need as much of the system in one room as possible, therefore we need the involvement of people with information, people affected by what happens and people with authority and resources to act"* (Appendix III Hertfordshire County Council Paper on Vision Conferencing and Future Search, 1997, page 1).

Trainers/facilitators can be drawn from a pool of expertise that exists in different organizations in the basin or from organizations with experience related to the Scheldt basin. (Examples: Stichting Idioms Partnership for European Education and Cross-cultural Experiences, University Network Teachers Integrated Water Management (RIVER21 Network) and many others.

6

Strategic conversations for river basin commissions

Together with Chapter 5, this chapter forms the linking pin between the experiences and lessons that can be drawn from the RIVER21 project (Chapters 2-4) and the challenges to existing river basin commissions that follow from the European Water Framework Directive. We decided to "walk the talk' and first wrote two stories, scenarios for the institutional environment in which European river basin commissions ought to be effective. The two scenarios are rather different, but in both worlds the success of coordinating water management depends on the rate of institutional learning and ability to build consensus in large networks. We describe paths to reach the goals for institutional learning in river basin commissions.

6.1 Two scenarios for the institutional environment of transboundary river basin commissions in Europe

What could the future of the administration of water management in European river basins be like? In the following paragraphs we present two different stories of how the institutional environment in which European river basin commissions operate may unfold. We describe how these futures may translate in terms of factors for failure or success of the coordination of transboundary water management. To envision the future, we have adapted two Global Scenarios 1998-2020 from Shell (Shell, 1998). The choice of keywords and examples in these scenarios inspired us to explore the meaning of the global developments for the water management in a transboundary river basin in Europe. [4,5]

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[4] The Shell Global scenarios contain many economic elements. We have not adapted these because that would require further research with special attention for those economic sectors that drive the changes in water management (industrial production, trade, agriculture, drinking water supply and sanitation, tourism). Economic sectors are important for the preparation of future water management decisions in the basin, but we consider writing scenarios for economic development a task rather than a prerequisite for the coordination of transboundary water management.

[5] We considered using the Scenarios for Europe 2010 from the European Commission (Forward Unit, 2000) also, but the Global Scenarios lent themselves better for our purpose. The Shell scenarios are concise and less detailed than the

The **Shell Global Scenarios 1998-2020** [6] are context scenarios: they describe the environment of the energy sector in terms of the major driving forces for change and their effects (Chapter 2.3). The Shell Global Scenarios specifically build on the notion that the forces of globalization; liberalization and technology are very strong and will shape the future. In fact, they say, there is no alternative (TINA). We can see this in how the economic markets, financial systems, government, and other far-reaching institutions evolve. Also, these forces are visible at the level of individual people: in many parts of the world wealth is increasing; people are better educated and have more freedom to choose than ever. The 1998-2020 scenarios tell two stories of how these forces may shape the future. The stories are called "The New Game" and "People Power."

In ***The New Game***, *the existing institutions have adapted well to globalization, liberalization, and new developments in technology.* New institutions have emerged also. Rules of play and models for best practice are important in the networks of government and businesses where the policies that affect the economic sector are being made. Information technology plays a large role in communicating these rules and models. The global markets and international decision-making arenas are transparent and efficient. This transparency allows and encourages a large number of players to enter an increasingly complex game. The competitive edge, in terms of profit or power, depends on how well the rules are understood and played by; on the ability to learn from success and failure; and the ability to tap into the experience of other parties. Business and institutions do best in ***The New Game*** when they function as learning institutions and continually reinvents themselves.

In ***People Power,*** *globalization, liberalization and technology bring wealth, choice, education and freedom to express values.* This leads to a growing expression of diversity and abandonment of long-standing traditions and social institutions (marriage, obedience to authority, political party membership, etc). Society is more volatile, very creative, less predictable, and changes ever faster. The unleashing of diversity leads to divergence of views and it becomes more difficult to build consensus. In this scenario, institutions find it difficult to adapt fast enough since the speed of change is very high. They learn and reinvent themselves but there is a growing lag between the changes in people and the necessary changes in institutions. Financial institutions are not able to adapt fast enough to changes in society. This contributes to the economic recession and necessitates people to create new solutions for their livelihood and pensions. People complain and feel insecure but there is also increased personal initiative. Many well-educated citizens join other like-minded people and international causes gain more

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Europe 2010 Scenario's. Many of the notions in the Global Scenarios are elements of the Europe 2010 scenarios also and this supports our choice for the Shell Global Scenarios.

[6] Shell made a choice in making globalization, liberalization and developments in technology elements of both scenarios rather than vary these elements. In January 2002, Shell published two new globlal scenarios which elaborate further on how global processes may enfold in worlds with different 'geographies of connection.'

attention from environmental or social activists (climate change, child labor, war crimes, etc). At the same time, people become increasingly active at the local level because that is where they can see results of their actions. Also, people may be more inclined to take individual action and take right into their own hands if authorities do not act against injustice. In the extreme, this may lead to violent acts directed against organizations responsible for environmental deterioration.

We have adapted these two scenarios for the world at large to scenarios for the environment in which European river basin commissions are charged with the task of coordinating transboundary water management. At first reading, the New Game scenario (Box 6.1) appears to be promising whereas the People Power scenario (Box 6.2) sounds like a doom scenario for water management. It is important to remember that these scenarios are not predictions but merely stories that highlight challenges to water management given a certain institutional and political context.

Box 6.1 A New Game in Europe in 2020

In the New Game Scenario, the European Union has been expanded and the institution develops quickly and progressively, setting up the frameworks with guidelines for regional legislation with regard to environment, economics, information technology and education.

The European Water Framework Directive has been evaluated, resulting in a better understanding of successful rules of play and best practices in water management. As a result, this Directive has been expanded to include issues of water distribution and groundwater resources as well. The call for public participation, high on the agenda in 2000, has given rises to many new, and often short-lived organizations, who represent local or sectoral interests in the planning of water management. Only a few organizations are successful in implementing their political agendas, especially those that have adopted the concepts of the learning organization.

The EU Commission uses audits on the successful use of EU funds to improve the sustainability of society. River basin commissions are audited for the effective distribution of its funds to improve the sustainability of water use and water management. The EU funds river basin commissions and controls their financial situation to strengthen the power of river basin commissions for implementation of the renewed EU WFD. National governments function as partners in a river basin commission, working together towards solving environmental, societal but also economic problems as they are related to water management.

Box 6.2 People Power in Europe in 2020

Residents of river basins have developed a larger interest in global as well as local developments. However, voting percentages for national and European elections have reached an all-time low. Consequently, the European Union has developed in a way that gives large autonomy to smaller regions in the Union. The model of the Belgian federation of states has been followed in other countries by granting much more authority over environmental management, economy, culture and education to small, culturally homogenous regions.

The process of regionalization in Europe has taken a lot of time since long-standing institutions had to be changed or abandoned completely. There is little solidarity among regions. These processes lead to further fragmentation of water management administration. This challenges the implementation of the EU-WFD; the goals for water management diverge widely and building consensus is very difficult.

At the same time, people are very active at the local level to achieve very specific goals in the management of local water resources and the local waterways. Local NGO's join forces at a supra-regional level to further their cause but these associations are temporary. Other organizations with similar interests, e.g. economic sectors, also join forces to further their goals when necessary. The economy goes into recession and this alters the demands on water management. The existing water authorities find it difficult to cope with the new constraints that are placed on water distribution and water quality. This creates a vacuum in decision-making, which is taken advantage of by active environmental groups or economic sectors, pushing regional water authorities to protect the local interests.

6.3 Possible challenges for river basin commissions in the European Union

The European Water Framework Directive calls for coordination of the implementation of the Directive at the level of the entire river basin. Given the two scenarios, what could be the challenges for a coordinating body or river basin commission?

In the New Game scenario, few large institutions are dominant and consensus appears to be achievable. In the New Game scenario, the European Commission funds river basin commissions and these compete for funding with other regional planning authorities in the EU countries. The central funding is linked to the authority that is given to river basin commissions to direct the strategic planning of water distribution and management, and to carry out audits to assess how well local water authorities succeed in the implementation of the rules and best practices for operational water management. To succeed in the New Game, the river basin commission must be able to take on an active role in supra-regional networks that have links to the water management in the river basin, such as global maritime transport associations, European road transport associations, global environmental organizations, and the network of metropole cities.

The New Game scenario offers opportunities to shape river basin commissions in the EU in a very different way than appears possible in the current situation. The coordination body also receives policy instruments (funding, right to audit) for the implementation of the EU-WFD. This is a break with the current practice of coordinating through dialogue only. On the other hand, the commission must perform well in its tasks not to loose these instruments. The river basin commission must compete with other organizations and water authorities for the strategic leadership. The success of the river basin commission depends on its ability to rapidly identify the critical issues for water management, on building consensus on how and how quickly these issues should be addressed and on the transparency of its decision-making and auditing processes.

The People Power scenario poses large challenges to coordinating water management; even though these challenges are not new they ask for different answers in the view of the implementation of the EU-WFD. In the People Power scenario, there are many institutions for water management within a river basin and this fragmentation leads to difficulties in reaching consensus. In this institutional environment, the river basin commission is torn into two directions: on one hand, the regional water authorities want to hold on to their own decision-power, making consensus building very difficult.

On the other hand, municipal governments and all types of non-governmental organizations call for a strong umbrella organization that can act on behalf of the (varying!) environmental and economical interests of the people in the river basin. When disappointed in the regional water authorities, entrepreneurial alliances of environmental activist, like-minded governmental organizations, and/or economic branch organizations develop new and creative ways to come to solutions for water management problems. Clarity of purpose and strong sense of values guide them. This empowers them to make decisions and build alliances where water authorities lag behind. In the People Power scenario, the river basin commission could be one of these alliances, composed of active organizations (with or without ties to government) that identify with the river basin and are able to organize (public) participation in decision-making.

6.4 Consensus building and institutional learning

In both stories (public) participation in decision-making, consensus building and institutional learning play an important role in the coordination of water management. In both scenarios, river basin commissions that can learn and adapt quickly are most successful.

Van der Heijden (1996) explains the link between consensus building and institutional learning in his book "Scenarios. The art of strategic conversation." He uses Kolb's theory of learning to explain the importance of consensus building in the institutional learning process (Figure6.1). This learning process is a process of conversation. In the conversation, mental models and ideas are aligned and lead to joint action (processual aspect). The experience of the joint action, or lack thereof, leads to new ideas and learning when the experience deviates from the expected (evolutionary aspect).

Observation of the experience and reflection lead to new concepts and theories (rationalistic aspect) on which joint action can be based. In this circle of institutional learning, the positive feedback loop depends on the variation of ideas and (learning) experiences. Less effective ideas are weeded out or rejected; effective ideas and mental models are kept for the future.

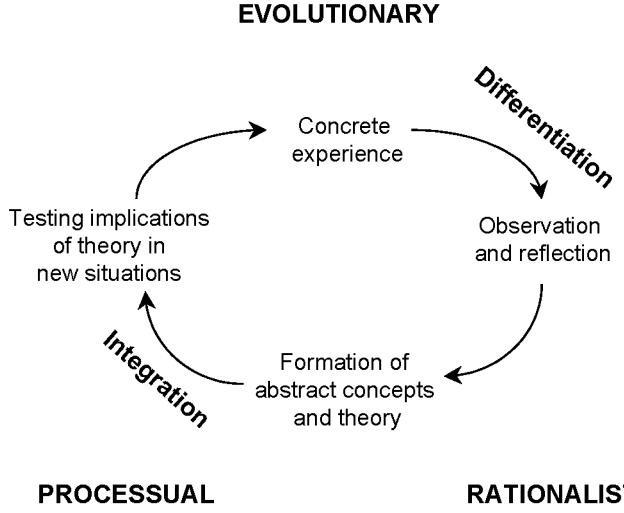

Figure 6.1 Kolb's loop of learning adapted for institutional learning
(in van der Heijden, 1996)

Cooperation and sensibilization even though different in nature and not necessarily combined, are both elements of institutional learning. Sensibilization is directed at enhancing the evolutionary aspects: individual people and organizations are made aware of the actual experience and this enhances their ability to observe and reflect. Sensibilization can be the jump-start for the motor that drives the learning process. Without sensibilization, it will be very difficult to convince individual people and organizations to participate in the public debate on the choices that ought to be made in water management. Cooperation among the individual members of the institution can be depicted as the motor of institutional learning. Without cooperation it will not be possible to either develop or adapt rules for water distribution through the vast network of river tributaries and canals and groundwater abstraction, nor to agree on best practices for water treatment, flood management, dredging of waterways, or nature restoration.

Van der Heijden (1996, p.45) is very explicit about the importance of cooperation, with that organizational learning is impossible, he says. "*The learning loop can only work in an institutional sense if people participate together, share ideas [...] resulting from reflection on experience, build a common theory, plan and act together.*" This process of cooperation can be seen as an institutional conversation, in which ideas are exchanged, examined, and adapted. The creation of an effective conversation requires a common language to name the objects and concepts of attention (river basin

idiom). Teams build their own language over time; they sometimes create a jargon that is not easily understood by outsiders. Sensibilization can help extend the common language beyond the in-crowd and support newcomers to enter the dialogue and contribute to the different aspects of the debate: the problem definition, selection of criteria for impact assessment, and the search for solutions.

6.5 Role for cooperation and sensibilization in strategic conversation

We have presented two scenarios for the future organization of river basin commissions and some theory about institutional learning and the roles of cooperation and sensibilization. Now we can answer the question how institutional learning (through cooperation and sensibilization) may contribute to sustainable water management in a European river basin.

Institutional learning is critical in both scenarios for the institutional future of river basin commissions. The success of institutions depends on the ability to adapt to changing demands from within the organization or the (political) environment in which it operates. The success of currently existing institutions depends on how they reinvent themselves in response to crises, if they can hold on to their competitive edge through fast learning processes, and if they can manage the divergence of ideas and experiences.

In the People Power scenario, institutions run the risk that the divergence of ideas becomes a self-enforcing process, causing the loop of institutional learning to spiral downwards so that consensus disappears. A lack of consensus within the institution impedes the pace at which the institution can adapt and learn. In the New Game scenario, the opposite problem is likely to occur. Learning is well embedded in the successful institutions but now there is a risk of "group think." Consensus is strong enough within the institution that it can start feeding on itself: the feedback loop spirals upward out of control. Observation and reflection on success and failure turn poor since they are no longer fed by a variety of ideas. The learning cycle slows down and the institution looses its competitive edge in getting funding and/or political support.

In both scenarios, the effectiveness of the river basin commissions will depend on the capacity for institutional learning and on the ability to manage the necessary diversity of ideas and experiences with water management, economic development, and environment in the river basin. Efforts to promote cooperation and sensibilization in the Scheldt river basin must be directed to enhance these.

In Figure 6.2 we show the relations that the River basin commission should establish to get a fundament for their future task. In the New Game scenario relation 1 is dominant; in the People Power Scenario relation 3 is dominant. Relationship 2 is relevant for both scenarios. Therefore, the best preparation for the future is to establish and maintain all three relationships rather than focus on only one.

Figure 6.2 only shows relationships in one plane, but the network is more complex. The many partners in the network are organized and operate at different levels: with the (transboundary) river basin, the local level, sub-basin or regional level, state and national levels are relevant for strategic and operaitonal decision-making.

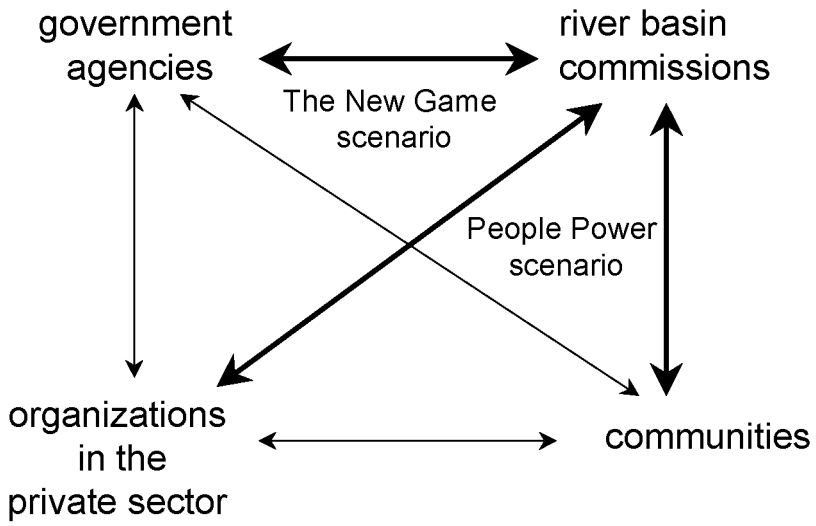

Figure 6.2. **Essential relations for strategic conversation in a river basin.** (Bold arrows point to relations that need to be established yet, other arrows point to existing relations.)

6.6 How to meet the goals for institutional learning within a river basin network?

We distinguish five learning goals for institutional learning within a river basin network. These objectives are derived from the overall goal of the European Water Framework Directive, theory on planning and policy making, theory on integrated water management, and our own experiences in the RIVER21 project.

Water management at the level of the river basin River basin planning requires understanding of the interdependencies of the water system, economic systems, and social systems at the basin level. Organizations participating in a river basin planning processes must master *integrated systems thinking* at the river basin level (in support of planning, negotiation, and evaluation) as well as the local level (in support of problem indication, authorization, and implementation).

Strategic decision-making The goal of sustainable water management in the Scheldt river basin is a long-term objective that will be frustrated by plans focusing on immediate goals. The river basin commission must be able to formulate appropriate *long-term goals* for water management, identify alternative ways to achieve these goals, and choose the most promising

strategy. This includes dealing with the contradictory demands on water management that are imposed by the differences among geographic regions, economic sectors, and cultural regions. This also includes negotiation, decision making under uncertainty about the future, and policy evaluation.

Network management The members of the river basin commission form a network among themselves, but they are also active in various networks within the geographic area where their activities take place. A river basin commission includes local communities, sub-basins, regions that are delineated by historical, social or economical interests, and states and even nations in transboundary river basins. Such a commission is itself included in supra-regional and even global networks. The members of the river basin commission, or the commission itself, is thus involved in vertical, diagonal and horizontal relationships among organizations within the and outside of the basin.

These relations within the network and with other networks must be managed to ensure the flow of information that feeds cooperation regarding planning and decision-making. A multi-level approach in network management, honoringthe organizations at different levels of aggregation within the basin, is called for.

Dealing with uncertainty River basin plans will be made under a great deal of uncertainty about the future. Understanding of the nature of the uncertainty has consequences for the impact assessment of promising water management strategies. Organizations participating in a river basin commission and/or in river basin planning processes must be able to contribute to the search for *robust strategies*.

"Dreaming" or visionary thinking The formulation of long-term goals depends on people and organizations that dare to communicate their vision of a desirable future. The *ability to dream* about "a better world" and to inspire others to share that dream is an important quality of leaders in the public and private sector.

Scenarios can play a role in meeting these objectives for institutional learning in a river basin organization. First, scenarios can play a role in all-important elements of the learning loop (van der Heijden, 1996, p.51). The process of building scenarios demands that the concrete experiences with the immediate past and present situation are made explicit and shared in the scenario team. Jan Goemaere, one of our Belgian students, acknowledged this when he said, "Scenario building is like looking in the mirror. You have to understand the present before you can think about the future." In the process of observation and reflection, a common language is being developed to be able to communicate knowledge on the immediate and future implications of alternative river management strategies. This common language is a very important asset in a network of organizations that represent a variety of mental models, experiences, and goals. This common language, as long as it qualifies as a "living language" can be used in the sensibilization of individual people and organizations that are not (yet) members of the river basin

commission (network) but whose interest or (political) support is called for. In Chapter 2 we have given several examples.

Second, scenario planning is a structured method that can assist in organizing the strategic conversation. As such, it challenges and sharpens the skills that have been listed as learning goals. The analysis of the present situation and identification of driving forces is only possible if the river basin commission members have good systems knowledge at a river basin level and are able to integrate different aspects of water management, spatial planning and economical development. Scenario planning is an excellent method to deal with uncertainty in strategic decision-making. The structure of the method can be used to activate the network within the river basin commission to organize information flows, align mental models, and come to a set of common goals. And last, but not least, scenario planning can be used to challenge people to dream about desirable futures and develop their ability to understand the possibilities of the future.

7

Discussion, conclusions and recommendations

In this report we first presented some theory on future studies, a description of a vision-building method that was used in a university setting, results from two vision-building exercises for an international group of MSc students exploring the future of the Scheldt river basin. As we are interested in the future of transboundary river management, we also explored the potential value of future studies for the implementation of the European Water Framework Directive, as well as for the design and operation of river basin commissions in a fast-changing Europe. We close off the report with some discussion and conclusions on the materials we presented. Also, we want to extend some of our insights as Recommendations for cooperation and communication in European transboundary river basin commissions.

7.1 Discussion and conclusions

A review of literature on future studies (Chapter 2) shows that there are different schools of thought, most notably the *"l'école française"* and the *Anglo-Saxon methods* developed in the U.S.A. and Britain. The Anglo-Saxon methods are more commonly used in the Netherlands because of the influence of the Royal Shell Oil Company, a Dutch-British enterprise, and the RAND Corporation. Cooperation in a European transboundary context must find a way to cope with the differences in the methodologies. We learned in the RIVER21 projects that all students were willing to adapt the Anglo-Saxon methods. Also, we learned that it was a challenge for the non-Dutch students to deal with the lack of formalization of these methods and the large claim on brain storming, creativity, imagination and 'thinking beyond the limits'. We are convinced that adaptation of the French method would have been equally challenging for the Dutch students and staff. The Europe 2010 scenarios (Chapter 2.6.3) are one example of how methods of the two schools of future studies may be used to build scenarios in an international context, honoring the different ways of thinking of the parties participating in the construction of the scenarios and their use in decision-making.

The vision-building exercise (Chapter 3) has been described as it was planned and scheduled for a two-week working period. Both times, in 2000 and 2001, students were able to produce a shared vision at the end of the

project. Perhaps they were more successful in 2000 than in 2001, as many discussions remained open in 2001 and students concluded afterwards that consensus had not been reached.

Students found it difficult to follow the systematic approach when they were not yet familiar with theory, concepts, and practical skills for systems analysis and future studies (e.g. scenario development). Nevertheless, the cooperation among students and their motivation were strong enough to overcome these handicaps. From a teaching point of view, we valued the completion of the vision-building exercise more than the quality of the execution of the individual steps in the process. By going through the entire process, students understood the meaning of 'dealing with complexity' as well as the meanings of "the river basin approach' and 'integrated water management'. This insight will be very valuable for heir further development, and perhaps future participation in planning processes for river basin management.

Time and money are the biggest constraints in our vision-building method and affected the results. As we wrote, there is little time for reflection during the two-weeks the participants are together. This reflection is needed to be able to process the information gained from the excursion activities and from the discussions in the working groups. The projects require all participants to look beyond borders and in the mirror. They discover not only different possibilities and threats to water management in the other riparian states, they also learn about other educational programs, working methods and principles. More time would allow participants to sort out these learning experiences, to better verbalize their own ideas and to come to new insights and compromises in the group discussions. A (far) larger budget for travelling would be needed to create more time in the vision-building process.

Academic schedules are not as flexible in France and Belgium as they are in the Netherlands. Therefore a two-week period is the best way to arrange to organize these type of projects. We have contemplated means to improve the quality of the vision-building process under these constraints, for instance the use of Internet for communication during the preparatory phase. However, in-depth discussions on Internet require time, dedication and trust. This trust cannot be build on the Internet but requires working side by side, the way the RIVER21 participants work together. Perhaps similar projects for professionals could make use of Internet or have more travelling funds available to build in more time for reflection during the vision-building process.

The results of two RIVER21 projects were presented as stories, maps and diagrams in student reports. The overview in Chapter 4 shows some of the most important notions that students incorporated in their problem analysis and visions. They were able to integrate the different aspects of economy, ecology and water resources management. The most important solutions to the problems that they formulated can be summarized as follows: more water purification, increased efficiency of water use, less diffuse pollution from agriculture, and (most importantly) functional differentiation of waterways, harbors and land use in the flood plains.

Visualization of problems, cause-effect analysis and visions for a future Scheldt river basin, were very helpful in guiding discussions. Visualization supports integration of different disciplinary insights and asks for great precision in the spatial and temporal aspects of analysis. In using the river basin as a basis for all maps, the participants were able to connect upstream and downstream concerns and started thinking according to the river basin approach. At the same time, they discovered the limitations of thinking within the watershed boundaries as sometimes-other boundaries were more appropriate system limits in addressing problems in water management.

Vision-building could contribute, in our opinion, to the process for successful implementation of the European Water Framework Directive. We see the cooperative drawing of integrated, transboundary plans for water management as one of the greatest challenges *and* promises of the EU-WFD. Without long-term planning we cannot achieve sustainable water management, the major goal of the EU-WFD. In that view, we value the potential of vision-building exercises in promoting a shared problem analysis followed by selecting shared goals for water management within a large time frame. Countries that can envision the future together will be able to find (creative) ways to solve the contradictions in current water management practices.

The proper organization of the cooperative planning process in a transboundary river basin is a major challenge for the implementation of the EU-WFD. Based on the analysis of the Shell Global scenarios 1998-2020, we see a need for a strategic conversation on the future of the institutions in the European river basins, and the associated chances and threats for water management. Institutional learning will be a key factor in the effectiveness of a coordinating body in river basin management. Strategic conversations can shape the framework for communication with the public, with public and private institutions and address the most important aspects of planning: common goals for a long time frame, with respect for ecology, economy, and society in upstream, midstream and downstream regions. Without such a framework, implementation of the legal framework of the EU-WFD may be achieved but sustainable river basin management will remain out of reach for the next and future generations.

7.2 Recommendations for cooperation and communication

Apply a multi-level approach to cooperation and communication. We argued that cooperation is essential for institutional learning, for consensus on a river basin management plan, and for the actual implementation of plans. This cooperation should take place at the highest level within the river basin network, where member states work together, and is to be supported by co-operative efforts and information exchange at other levels and in related networks. Thus, efforts to promote cooperation for the benefit of water management on the basin level must be directed at different groups:

- The network of water authorities in the upper, middle and lower regions of the Scheldt river basin;
- Within a particular sub basin, the network of the water authorities and other governmental institutions related to care for the environment, economic development, and spatial planning;
- Within a particular sub basin, the network of these authorities and representatives of economic sectors, NGO's and the public;
- The network of the river commission with other international institutions that protect economic, environmental or social interests (e.g. other river commissions, industrial and maritime transportation associations, World Wildlife Fund).

Build and fund a network that consists of horizontal and vertical relationships, where representatives meet regularly and exchange ideas. Use their commitment to mobilize the organizations they represent. Offer courses and professional networks for continuing education related to the implementation of the EU-WFD.

Start vision-building and scenario development at the basin-level in informal networks Enable another, more informal way of working that stimulates communication and ability to share concerns and ideas. Based on these experiences, formulate, together with the important actors, ways to come to a river basin plan with joint objectives, a plan of measures, and a communication strategy. Pay attention to the enlargement of the "circle of influence" of the coordinating body to address interdependencies while respecting the reality that Member States have their territorial responsibilities.

The RIVER21 network is an example of an informal network: universities cooperate and experiment with methods for future studies within a common river basin their countries. Such a network could be involved in (forming other) other informal and formal networks (e.g. WATECO working group for the implementation of the EU-WFD).

Invite experts to help establish strategic conversation and make funds available. Invite process facilitators, experienced in policy analysis and future studies who are able to link water management with the socio-economic issues at stake. These experts may be drawn from international businesses, international consulting companies, business schools and universities that teach strategic conversation methods. Preferably, experts are willing and able to work within the context of the different schools in future studies that can be distinguished in the river basin.

Make information and knowledge about the basin widely available
Public participation in decision-making, consensus building and institutional learning are important for successful river basin management. A prerequisite for this is a transparent information strategy for the entire river basin.. Public access to information in a clear format is a prerequisite to creating and finding possibilities for basin-wide exchange of ideas, for the use and exchange of expertise, for capacity building, and for monitoring of the progress. Access to information can thus contribute to creating the "Scheldt" feeling.

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