

IL DELTA DEL PO: SCENARI POSSIBILI DI UNA TERRA DI NESSUNO

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Note metodologiche

Il Delta è uno spazio-territorio da sempre conteso in un inafferrabile gioco di terra e acqua. Esso subisce però dei cambiamenti di valore a seconda che la risorsa selezionata dalle differenti logiche di potere che ne hanno gestito l'evoluzione sia l'acqua o la terra.

In questa sede l'obiettivo è la comprensione e l'interpretazione delle soglie di rottura che hanno determinato le modificazioni di valore del territorio. Più precisamente è stata focalizzata l'identificazione delle "strategie", delle "razionalità" attraverso cui l'uomo evolve lo spazio in territorio isolando dei "quadri spaziali" di vita collettiva definiti da:

- un pacchetto iniziale di risorse: acqua e terra
- un determinato progetto sociale
- un preciso sapere territoriale culturale e tecnico

Non si è trattato comunque di una sclerotizzazione entro rigide linee di contorno quanto di cercare di ri-proiettare - sullo sfondo delle caratteristiche fisiche di un "luogo" - l'evoluzione della territorializzazione del Delta analizzando le interazioni tra sistemi naturali e umani, nella loro progressiva complessificazione. Le linee metodologiche si rifanno alle teorie relative allo spazio: "luogo dei possibili" e al territorio: "insieme di relazioni sorte in un sistema tridimensionale società-spazio-tempo" (Racine, Raffestin, Ruffy, 1978:13), ai sistemi per maglie, punti, reti. Queste varianti geografiche compongono il tessuto territoriale in ordine alle logiche di potere responsabili dei criteri di suddivisione di un'area. Viene considerato inoltre il concetto di catastrofe intesa come un'interruzione del sistema coinvolto in un procedimento causale chiuso che ammette le mutazioni evolutive all'interno della circolarità ma non la perdita della stessa e forse ancora più efficacemente secondo Thom come "il passaggio di un sistema da uno stato strutturalmente stabile ad un altro attraverso un cammino stabile di trasformazione" (Thom, 1980:18-19).

Il Delta dallo spazio al territorio

Lo spazio Delta ora sospeso ora sommerso in un indifferente gioco d'acqua è uno "spazio irrisolto". Le incertezze di questa definizione hanno rappresentato un'eredità che ha avuto influenze nelle pratiche di territorializzazione. Parlare di territorio infatti "è fare riferimento implicito alla nozione di limite, che anche se non è tracciato, caso frequente, esprime la relazione che un gruppo mantiene con una porzione di spazio" (Raffestin C., 1983:149-150). Oggi parlare di spazio-Delta significa considerare la superficie compresa tra i due rami estremi del Po: Po di Levante a nord, Po di Goro a sud dalla loro biforcazione a S. Maria in Punta e fino alla frangia costiera.

Nell'evoluzione del Delta da spazio a territorio gli "attori" che hanno orientato la territorializzazione, responsabili quindi delle diverse evoluzioni sono stati considerati secondo una preciso criterio. Essi corrispondono, a seconda delle loro "interpretazioni" territoriali, a logiche autocentrate, quando si verifica un'assonanza tra i gruppi sociali che controllano la territorializzazione e quelli che di fatto la producono - caso raro nel Delta - o a logiche eterocentrate con creazione di conflittualità progressivamente sempre più complesse. E' quanto praticamente è successo nel Delta da sempre.

Scenari possibili di una terra di nessuno

La storia del Delta legata alla "storia" del "grande fiume" rivela nel suo procedere sconvolgimenti di tale intensità da imporre spesso nuovi ordini territoriali. Questi "colpi di spugna" si possono suddividere secondo un criterio qualitativo in catastrofi naturali e umane. Le prime sono responsabili dei mutamenti territoriali fino al 1600. In seguito la regia è passata decisamente di mano ed è risultata espressamente umana. Questi eventi perturbativi interferendo nel sistema - spazio, territorio, tempo - ne hanno destrutturato il procedere tendente alla stabilità. La trasformazione frequente e la decadenza degli aspetti peculiari che costituiscono il codice di riconoscimento del territorio, il farsi e il modificarsi continuo, hanno creato il problema essenziale della "perdita di memoria" per la continua frammentazione del percorso di costruzione non solo materiale ma soprattutto culturale che un gruppo compie sul territorio in cui vive. Il Delta appare così un territorio dalla memoria e quindi dalla "storia" semplificata.

Proprio nel Delta dunque risulta interessante studiare lo "scarto" tra potenzialità e vincoli fisici in relazione alle scelte dei percorsi di "edificazione territoriale" potenziali e materializzati. Diventa importante l'interpretazione delle scelte e delle progettualità adottate dagli uomini per il controllo del territorio. In questo senso il Delta ha esercitato nei vari scenari funzioni diverse. All'inizio erano funzioni relazionali, nel caso di luoghi attraversati da percorsi commerciali, e che venivano coinvolti come sedi di operazioni mercantili in circuiti economici e sociali internazionali (ad esempio Adria e Spina). Alcuni secoli dopo invece il Delta ha avuto funzione di fornitore di risorse, soprattutto finanziarie, ma anche umane nonché di utilità economica, nei confronti di aree forti (Venezia). All'interno dello Stato italiano la funzione del Delta si è concretizzata nella richiesta di interventi per uscire dalla condizione di regione trainata.

Ora, contrariamente a quella percezione generalizzata che per il Delta seleziona la terra come risorsa prima, è sull'acqua che avviene la più importante specializzazione e organizzazione verso cui si incammina la territorializzazione. E' dalla peculiarità delle condizioni idrografiche, infatti, che dipende la maggiore o minore vitalità di questo spazio. Le logiche dell'autoriproduzione si impostano sulla possibilità di svincolare la risorsa acqua dall'imprevedibilità che la governa.

Nell'impossibilità di leggere per intero il difficile e lungo percorso della territorializzazione deltizia, in questa sede si propongono due situazioni "estreme" nella storia del Delta che permettono di comprendere anche attraverso una trattazione piuttosto scarna degli avvenimenti i differenti esiti per e sul territorio delle logiche di acqua o di terra.

L'epoca greco-etrusca

Ancora nel VI secolo a.C. il Po si presentava con due grandi rami di cui quello settentrionale, Po di Adria, era il principale. L'altro, conosciuto come Po di Spina, scorreva ripartito in diversi alvei, molto più a sud. I tratti dell'insediamento relativi al periodo greco-etrusco confermano per la regione deltizia una funzione privilegiata legata all'acqua, in quanto area idonea agli scambi commerciali. Ne dà testimonianza la collocazione "strategica" dei siti allineati lungo i rilievi arginali e alle foci dei rami fluviali. La loro struttura articolata è indice di un popolamento consistente e ne sottolinea un ruolo tutt'altro che marginale. Durante l'età greco-etrusca i traffici si allargano a comprendere nell'entroterra oltre la pianura occidentale, attraverso le vallate dell'Appennino, i territori centro italici dell'Etruria e sul mare le civiltà egree.

Potremmo individuare, tra le località del Delta e i centri greci ed etruschi, pur nell'ottica di una territorialità eterocentrica, relazioni quasi "simmetriche": gli scambi tra questi due ordini socio-spaziali risultano nella maggioranza dei casi importanti. Avviene rispetto al

centro della cultura etrusca una produzione differita di territorio. Periferie integrate o "associate" e non dominate (Reynaud, 1984:38 e 87).

Ma gli effetti della rotta di Sermide (VIII sec. a.C.) conseguente ad una fase di inasprimento climatico, a cui si legarono diversi cambiamenti idrografici andavano inesorabilmente determinando la progressiva perdita d'importanza in generale dei rami del Po in territorio veneto, a favore di quelli ferraresi. Questo evento che inizialmente avvantaggia Spina si porrà in seguito tra le cause della sua fine. La città si allontana lentamente ma inesorabilmente dalla costa e il porto finisce per interrarsi.

Il dominio veneziano

A partire dal XV secolo Venezia, da sempre rivolta all'acqua, si trovò a dover prendere in considerazione l'entroterra, modificando un atteggiamento di "ateritorializzazione" che ne aveva caratterizzato l'intervento fino a questo punto. Le motivazioni sono diverse. Il suo ruolo nell'economia europea si stava incrinando, soprattutto in relazione ai più vulnerabili rapporti con i mercati dell'Est e per i possibili effetti delle politiche espansionistiche che in misura maggiore o minore animavano tutti i principali potenti d'Italia. Venezia inoltre aveva raggiunto dimensioni demografiche preoccupanti con un'impellente necessità di trarre profitto dalla terra.

Il Delta, con la potenzialità di venir bonificato, iniziò ad essere riconsiderato. Per questa periferia tale "interesse" si tradusse in una nuova dominazione.

Sempre all'interno del disegno a documento della sua potenza sulla terra, Venezia collocò l'ambizioso progetto del Taglio di Porto Viro le cui conseguenze imprevedibili a livello di assetto idraulico lo furono ancor più a livello politico in quanto costituirono il presupposto alla completa venezianizzazione del Delta. Alla fine del Rinascimento, infatti, il Po aveva con le sue diramazioni costruito un delta, tra la foce dell'Adige e Porto Levante, praticamente corrispondente all'attuale litorale. Ma scopo principale dei veneziani, accanto a quello più noto dell'allontanamento del pericolo di riempimento della laguna, fu "... di impaludare le Bocche del Po portandole a sfociare verso i bassi fondali del delta primitivo, in modo da creare una situazione che consentisse l'accesso delle navi al Po solamente attraverso i Canali Veneti, ben presidiati dalle forze della Repubblica" (Sortino, 1972:6). L'intervento veneziano con il Taglio di Porto Viro indirizza verso sud le maggiori portate del Po a scapito dei rami settentrionali. Inizia con questo forte atto la costruzione del delta moderno.

Azioni e relazioni che coinvolgono la risorsa acqua e la risorsa terra però non costituiscono informazioni centrate sul Delta ma diventano energie che corrispondono a centri esterni ed estranei al territorio. Le logiche coloniali o di prelievo accantonano immediatamente la considerazione dell'interesse collettivo per il vantaggio individuale o di classe, quella veneziana naturalmente. Il Delta subisce in modo sempre più inequivocabile e definito una netta emarginazione.

Venezia attraverso una specifica e potente istituzione quale il Magistrato alle Acque procede non solo alla vendita ai privati delle terre che vengono bonificate ma, con il particolare accordo "vendita di onde di mare" vengono assegnate a nobili e patrizi veneziani ampie aree vallive e terreni non ancora consolidati. Immediatamente si provvede ad annullare quei diritti di uso civico che Venezia stessa in precedenza aveva garantito, le consuetudini d'uso di valli e paludi che le popolazioni del Delta avevano disciplinato con norme che ne salvaguardavano il ruolo sociale ed economico. Cominciano i primi movimenti migratori, poiché l'impedito transito nelle valli toglie ai poveri l'unico mezzo di sussistenza. Erano state proprio queste risorse invece che, a partire dal Trecento, avevano giustificato l'immigrazione

in Polesine e nel Delta di numerosi nuclei familiari provenienti da vari centri dell'Italia settentrionale.

Lo "strappo" nel caso veneziano non è più rappresentato solo da discontinuità improvvise e inattese, create da un elemento che viene ad aggiungersi a quelli in gioco ma da elementi costitutivi della territorialità costruita. E' un'evoluzione che complica l'individuazione delle cause e propone il problema della "reversibilità dei processi attivati" e delle risposte che i gruppi sociali elaborano per reagire agli eventi di crisi, tema di rilievo nell'interpretazione geografica della costruzione del territorio.

I veneziani lasciano un'eredità su cui poi solo a partire dall'Unità interverranno "atti" potenzialmente di enorme portata per la trasformazione del territorio: la bonifica meccanica, la bonifica integrale e la riforma agraria. La risorsa selezionata è sempre la terra in un tentativo di progettare scenari per una organizzazione territoriale impostata almeno nelle intenzioni secondo un disegno di giustizia socio-spaziale. Questi interventi di particolare evidenza politica sono l'espressione della strategia informativa del centro, tanto che non si sono tradotti in costruzioni in grado di autoriprodursi.

Conclusioni

Nel Delta dunque è mancata a lungo la logica di garantire pluralità di risorse, di scelte e di condizioni di produzione attraverso cui arginare e riassorbire le crisi sia naturali che sociali. Oggi finalmente la gente del Delta sembra in grado di dare segnali chiari della necessità di individuare logiche autocentrate attraverso cui gestire il proprio territorio. E questa volta ritornando a privilegiare l'acqua.

Forse l'impronta iniziale di un Delta in cui logiche autocentrate avevano individuato una trama territoriale dove nodi e reti intrecciavano strategicamente l'acqua e la terra potrebbe riemergere orientando il recupero di un significato e di un ruolo che secoli di logiche eterocentrate hanno cancellato e confuso a conferma dell'esistenza della possibilità di un "gioco del rovescio" nella gerarchia delle classi socio-spaziali.

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DE L'EAU DANS LES PAYSAGES AUX PAYSAGES DE L'EAU

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Une problématique des paysages de l'eau

La terre, l'air, le feu... et l'eau. Au milieu des quatre éléments fondamentaux, l'eau est une force à part. H_2O , elle est l'élément primordial, celui qui par son abondance et par sa qualité déterminera le sort des hommes. Couchée sur l'euclidienne topographie de nos cartes, elle devient forme. Forme instable qui structure et déstructure l'espace au gré de ses caprices. Exploitée, elle devient une force capable d'entraîner les machines. Enfin, jalonnée de guinguettes et d'hôtels avec vue, l'eau est environnement. Chacune de ces quatre dimensions est une ressource qui peut, qui doit être gérée. L'eau-élément est consommée puis vendue; elle est stockée ou gaspillée, partagée ou jalousement conservée. La problématique de l'eau-élément s'organise autour de l'offre et de la demande; autour du besoin "relatif". L'eau orographique fertilise les terres par ses crues, qui charrient le limon précieux. Endiguée, parsemée d'ouvrages hydrauliques, de ponts, de gués, d'écluses, exploitée par quantité d'usines de la minoterie à la centrale, la forme de l'eau est aussi une force. C'est l'eau-énergie. Enfin, l'eau-environnement s'inscrit dans l'espace perçu; c'est un peu l'eau des cartes postales, qui prend racine dans les méandres compliqués de nos représentations. L'eau-environnement est celle que les guides touristiques signalent. Elle est attractive ou répulsive, et dans cette dialectique elle allie des critères objectifs de perception à une forte subjectivité. C'est l'eau-paysage.

Qu'est-ce qu'un paysage?

Le paysage n'est ni objet, ni sujet; aucune science, physique ou humaine, ne peut en revendiquer l'apanage. Il fut d'abord considéré comme une donnée invariante par des sociétés qui n'avaient pas la notion des temps long et court, et ignoraient les processus d'évolution dépassant l'échelle humaine. Le paysage était donc ancestral, c'est à dire antérieur à la mémoire: né de la création divine, il était immuable sauf par le biais de quelque catastrophe. Par la suite, la géographie physique s'est appropriée cette notion de paysage pour désigner des configurations physiques, sans prendre en compte la dimension humaine, mais surtout la valeur symbolique des lieux, ces fables d'un autre âge qui ne pouvaient que nuire à l'objectivité scientifique. L'objet physique était du domaine de la science, sa valeur symbolique de celui de la plus pure fantaisie. Dans ces années de science dure imprégnée de positivisme comtien, un psychanalyste disciple de Freud, Carl Gustav Jung, réclamait qu'on accorde au moins à ses théories "le niveau du pou, qui, après tout, jouit de l'honnête intérêt que lui porte l'entomologiste..." Les théories de Jung portaient sur l'existence d'un inconscient collectif, universel, influant sur le comportement des sociétés: les archétypes. Mais Jung introduisait surtout la dimension de la perception, qui n'était plus seulement objective. La prise en compte de cette nouvelle dimension dans les problèmes géographiques, un intérêt nouveau pour les travaux des sciences humaines venant compléter les apports des sciences physiques, et une forte sympathie pour l'histoire et le temps long, changèrent le concept de "paysage", pour le placer désormais à l'interface des hommes et des milieux. Témoin de cette évolution, Gabriel Rougerie publiait en 1977 un ouvrage de géomorphologie sous le titre *Géographie des paysages*. Quinze ans plus tard, il publiait avec

Nicolas Beroutchachvili *Géosystèmes et paysages*, où le concept avait cette fois l'acception de l'école "humaniste", c'est à dire qu'il était beaucoup plus proche de l'espace vécu et perçu que de l'unité morphologique.

Une gestion du paysage?

La plupart des études paysagères s'organisent autour d'une problématique de gestion. "Gestion du paysage"; la motivation est plaisante et le mot est à la mode. Depuis quelques années, il court de corridors de bureaux d'études en antichambres de ministères; on le mentionne dans des textes de lois, on lui dédie des commissions. Mais le concept reste flou, l'action mal définie, car l'objet lui-même, le paysage, n'est pas connu. Si l'on parle, en revanche, de "gestion de l'espace", d'aménagement du territoire, le champ sémantique se resserre. L'expression évoque des structures bien établies, un matériel théorique et pratique, et une expérience. Quelle que soit notre propre opinion sur la qualité de l'aménagement du territoire en France, il y a déjà une cinquantaine d'années que cette pratique est institutionnalisée. Tout ce bagage apporte aux velléités d'aménagement du territoire une certaine légitimité. Cet acquis n'existe pas en matière de gestion paysagère, et l'on voit mal comment gérer le paysage sans se lancer dans l'aventure empirique, alors même que le paysage n'en est qu'au stade du concept le plus flou. Pour nous, le paysage n'est finalement qu'une entrée dans l'espace; une clé dont la pertinence nous semble forte, mais qui reste à démontrer. C'est en ce sens que le paysage est objet géographique.

Vers une nouvelle approche des paysages de l'eau

Notion d'interface

Depuis une dizaine d'années, de nombreuses publications tendent à faire du paysage un espace chargé de sens, un objet défini à la fois par les contraintes du milieu et la façon dont les sociétés remplissent l'espace. Jusqu'à Augustin Berque qui donne dans *l'Encyclopédie de Géographie* deux définitions pour le paysage: le paysage tel qu'il est, conception uniciste, et le paysage tel qu'il est perçu et vécu, conception plurielle. Il y a au moins deux façons d'aborder le paysage perçu. L'une consiste à relever les éléments communs à toutes les représentations pour définir un paysage théorique, sinon idéal, tout au moins consensuel. L'autre consiste à étudier chaque représentation dans son exclusivité, puis de comparer l'ensemble de ses représentations pour comprendre les oppositions et les conflits inscrits dans l'espace. L'étude du paysage devient un outil géographique efficace pour l'analyse des dynamiques socio-spatiales. Cette démarche nécessite l'étude des groupes sociaux porteurs de ces représentations, et de leur rapport à l'espace. Il s'agit de définir des *groupes de représentations*.

Ils sont définis sur la base de leurs usages, de leur histoire commune, et de leur imaginaire. Cela suppose une étude historique sur le temps long, qui se traduit par le dépouillement des archives, la lecture de la littérature locale d'une part, exogène d'autre part, et une attention à la tradition orale même si, hélas, celle-ci est devenue presque obsolète. Cela suppose des enquêtes directes, ou de questionnement photographique ou graphique, c'est à dire que l'on demande aux individus concernés de prendre une photographie ou un croquis de paysage sur la base d'éléments nécessaires à l'étude.

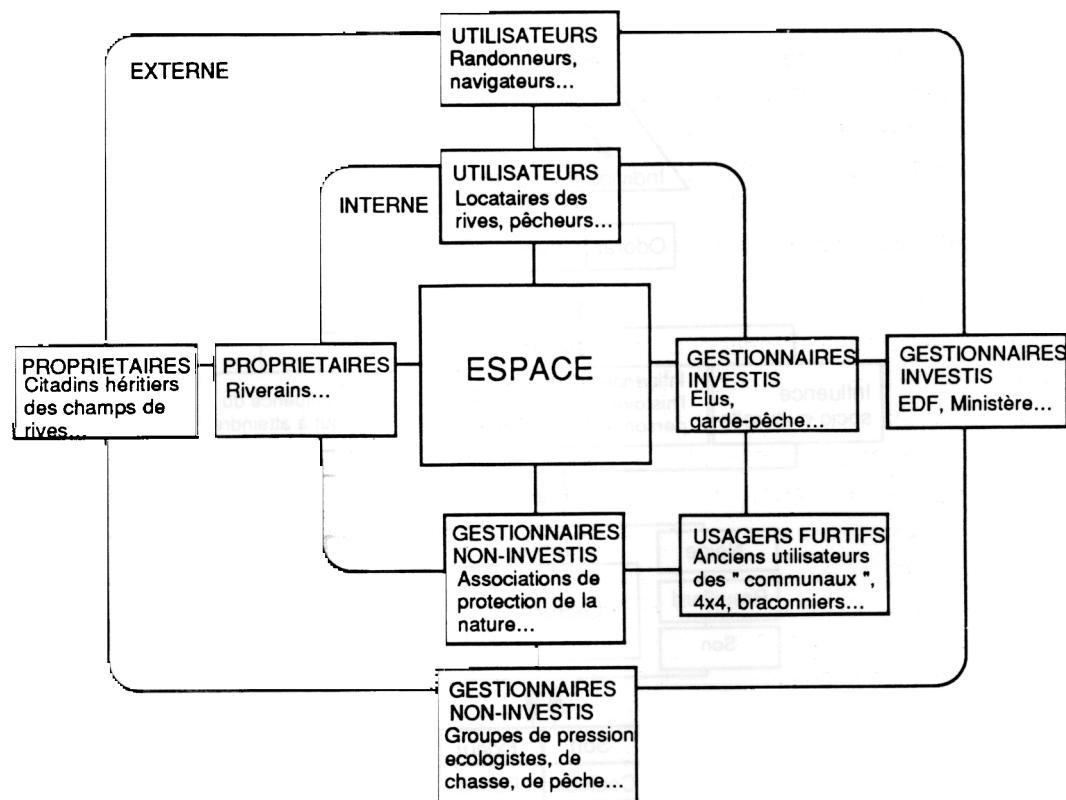
Cette logique de groupes nous a amené à produire le schéma reproduit ci-dessous. Nous l'avons adapté empiriquement au cas de la rivière à partir d'une étude réalisée en 1992 sur le milieu forestier. L'éloignement progressif des groupes de représentations de l'espace de référence s'accompagne d'un éloignement du concret, c'est à dire d'une acuité plus forte des valeurs archétypales. Nous empruntons au philosophe Gaston Bachelard sa dialectique du

dedans et du dehors; la progression du proche vers le lointain s'accompagne d'une progression du concret vers l'abstrait. Les deux représentations fondamentales sont donc *interne* et *externe*.

La représentation interne est définie par une longue relation de proximité. Dans cette catégorie, il faudra distinguer différents types de représentations. Certains ont établi une distinction fondamentale Acteur/Utilisateur/Spectateur, mais elle nous semble difficile à appliquer, car chaque groupe nous paraît tenir à la fois chacun de ces trois rôles.

La représentation externe est définie par un éloignement géographique et une forte coloration archétypale. Les groupes de représentations sont sensiblement les mêmes, à l'exception des usagers furtifs qui, bien-sûr, disparaissent. La différence n'est que d'échelle. Insistons sur les deux dimensions qui définissent les groupes: une situation géographique, et un comportement.

Fig.1: Organisation spatiale et hiérarchique des groupes de représentation



Lectures et écritures du paysage

Le paysage se situe à l'*interface* du subjectif et de l'objectif, de la contrainte physique et de la représentation psychologique, des hommes et des milieux. Cette notion implique deux dimensions:

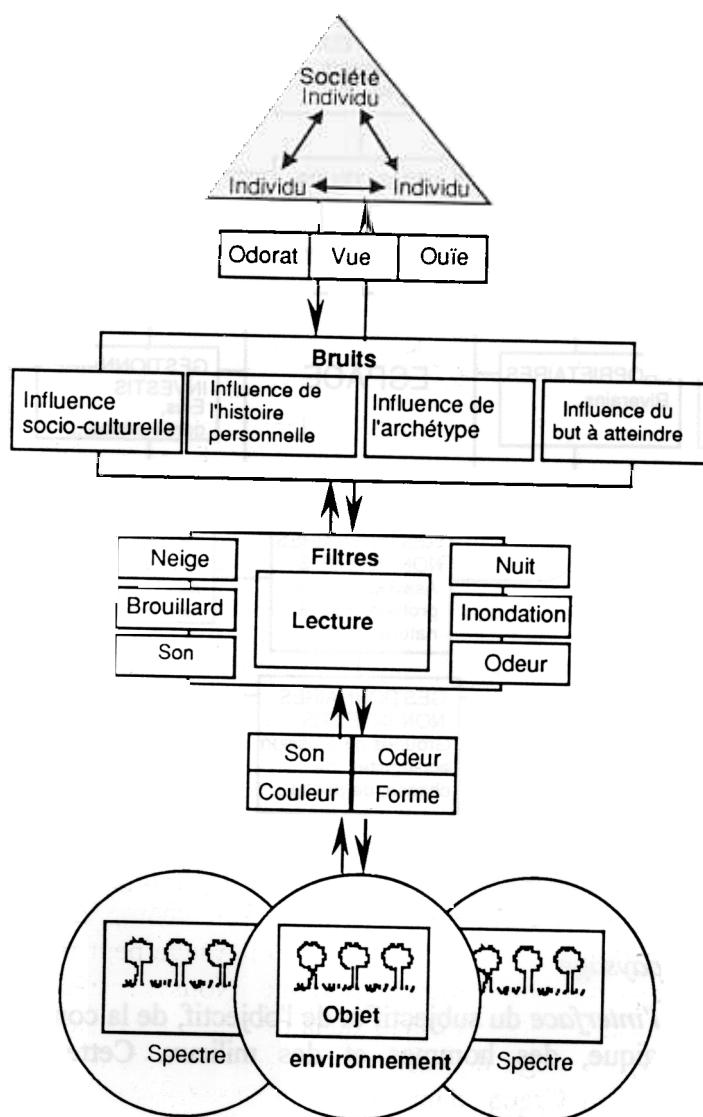
- l'interaction d'éléments divers, et donc un rapport de forces;
- le dynamisme du paysage.

Si le paysage n'était plus un objet, il pourrait être lecture et écriture des sociétés sur leur espace. On admet donc le paysage comme une sorte de connaissance absolue, une lecture

universelle, dans laquelle se reconnaissent à la fois l'individu et l'humanité toute entière. Or, nous avons tous notre propre vision du monde. Ce poncif nous pousse à admettre qu'un certain nombre de facteurs, intérieurs ou extérieurs, viennent perturber la lecture à différents instants de son déroulement. Ces facteurs interviennent soit au niveau de la transmission, c'est à dire au niveau de l'objet, soit au niveau de la réception, c'est à dire à notre niveau. Dans le langage de la théorie de la communication, ce sont:

- des bruits, c'est à dire des émissions parasites qui transforment la nature même du message;
- des filtres, c'est à dire des émissions parasites qui modifient temporairement les conditions de la lecture. En photographie par exemple, les filtres sont utilisés pour intercepter certaines radiations du spectre lumineux;
- des spectres, qui sont le résultat de la superposition de tous les états d'un paysage à l'instant T. Le fleuve est à la fois tous les fleuves du monde, et le fleuve dans tous ses états.

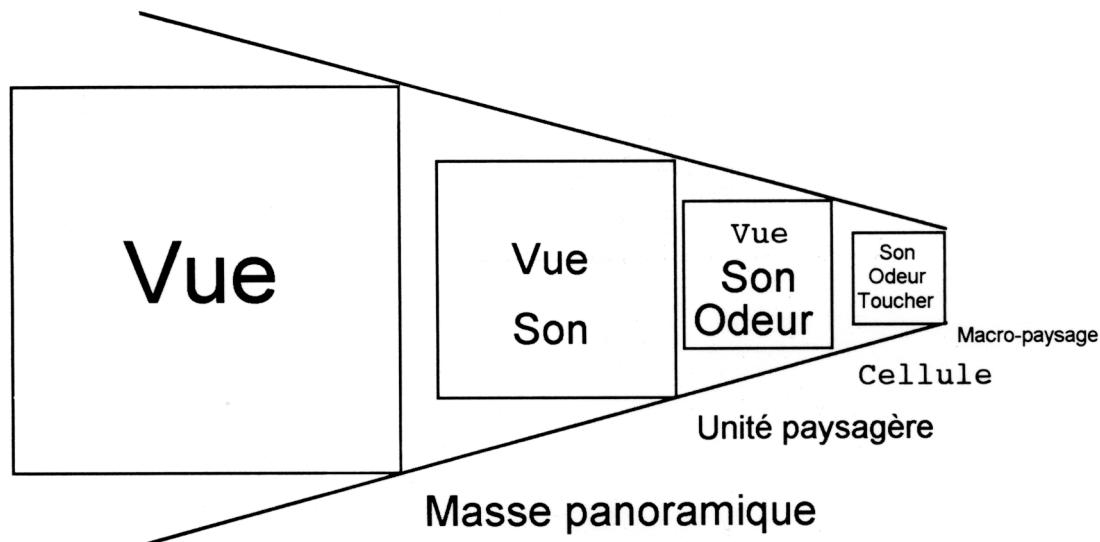
Fig.2 : Lectures et écritures du paysage, processus de perception



Les sens de la perception.

La méthode d'approche conduit à un élargissement des méthodes traditionnelles, basées sur une analyse du visuel. Il s'agit de réintroduire tous les sens dans l'étude des mécanismes de perception: la vue, l'odorat, l'ouïe, et de façon plus marginale le toucher, voire le goût. Ces dimensions introduisent dans la lecture une subtilité nouvelle. L'odeur, par exemple, intervient indéniablement dans la perception, bien qu'il soit toujours très difficile de définir une odeur, comme j'ai pu m'en apercevoir à l'occasion d'une enquête réalisée l'an passé. Je demandais aux individus d'associer une odeur à un type de paysage particulier. Souvent, les odeurs sont rapportées à des sensations plus vastes: l'odeur de la montagne, c'est l'air pur; celle de la mer, c'est le grand large; pour la ville, c'est la pollution, etc... En fait, la perception olfactive doit souvent être ramenée à l'opposition fondamentale *attraction/répulsion*. Certains psychologues ont essayé de définir la part de chaque sens dans les mécanismes de perception, et ont abouti à des résultats dont la précision porte à sourire: 83% des impressions viendraient de la vue, 11% de l'ouïe, 3,5% de l'odorat, 1,5% du toucher et 1% du goût (Fischesser). Pour nous, géographes, la question ne se pose pas en termes de proportion, mais d'échelles. D'autre part, les psychologues reconnaissent également, par exemple, qu'il est très difficile de faire la part du goût et de l'odeur en dégustant un plat. Je pense à ce cas de psychiatrie cité par Kandinski de l'homme qui trouvait que sa sauce avait "un goût de bleu".

Fig.3 : Transfert d'échelles et perception



Outre le phénomène d'échelle, il y a des impulsions prégnantes dans le paysage, et celles-ci ne sont pas toujours liées à la vue: que l'on songe au grondement obsédant d'une cascade, au murmure d'une source, à l'odeur âcre d'un champ de tabac, au bruit d'un aéroport, à l'odeur nauséabonde d'une décharge... Un paysage peut tirer sa spécificité d'une impulsion principale, qui n'est pas forcément pérenne. Nous sommes pleinement dans une problématique de gestion, et de mise en valeur de la ressource "paysage de l'eau".

Dans la littérature, le paysage de l'eau est souvent représenté à travers l'une de ces impulsions prégnantes. Julien Gracq, dans *Les eaux étroites*, écoute le paysage de Loire. Dans l'œuvre d'Henri Bosco, qui inspira Gaston Bachelard, la Camargue est un chant: chant ou plainte du vent d'Ouest qui laisse un goût amer sur les lèvres du bouvier, gémissement des arbres, murmure des eaux ou voix tonnante du fleuve Rhône. Bosco fait parfois de la rivière "un lieu uniquement sonore..."

Faisant référence au mythe philosophique de la statue de Condillac, Gaston Bachelard se définit comme odeur de la menthe des eaux.

La question de l'échelle pose aussi le problème de l'eau-paysage et de l'eau élément du paysage, c'est à dire du moment où l'eau cesse d'en être un élément, même majeur, pour devenir un paysage à part entière.

Le paysage est donc une clé d'entrée dans l'espace, dont il devrait permettre la valorisation, et une meilleure adéquation entre les aménagements et la perception des sociétés. Le temps n'est plus au centralisme jacobin qui confondait égalité et similitude, et pensait que ce qui était bon pour les uns était bon pour les autres, que ce qui était bon pour la nation était bon pour les citoyens. La gestion du paysage est compliquée par les deux dimensions qui font de l'espace de l'eau un paysage: les données subjectives de la perception, et les données physiques propres au milieu, qui appartiennent à l'hydrologie, à la climatologie, tout ce qui conditionne la réactivité du milieu. Nous nous heurtons en quelque sorte à une double inconscience: de la subjectivité de la perception, et des contraintes physiques à travers l'oubli presque instantanné des catastrophes. Jamais les averses n'ont été aussi fortes, les crues si violentes. La problématique paysagère est une problématique géographique à double titre: comme la géographie, elle se situe à l'interface des sociétés et des milieux, et elle permet de penser cet interface en termes concrets en fournissant des outils de gestion.

LOS ESPACIOS AGRARIOS TRADICIONALES DE LA COMUNIDAD VALENCIANA: EVOLUCIÓN E IMPACTOS AMBIENTALES.

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Introducción.

En el sureste peninsular, los condicionantes climáticos combinados con las disposiciones del relieve han determinado las directrices básicas para un aprovechamiento racional del territorio. El hecho de que las precipitaciones, además de escasas presenten una fuerte intensidad horaria y concentradas en la estación otoñal, ha obligado al hombre de estas tierras a tener una doble aptitud, de una parte buscar los medios de aprovecharlas y procurar regularlas para repartirlas a lo largo de todo el año y, de otra, adoptar una serie de medidas para defenderse de las ondas de crecida que se generan. Así pues, es en las regiones mediterráneas donde se plantea de manera más aguda la cuestión de las relaciones entre el agua, su propiedad, sus técnicas de explotación y los modos de producción. La escasez de caudales hídricos y su capacidad de crear riqueza los convierten en un medio de producción tan importante como la tierra, el trabajo y el capital. Siendo, por tanto, su control el elemento que prima en la organización del espacio.

Las actividades antrópicas se han caracterizado por una intervención secular que supondrá una modificación relevante del paisaje natural, el cual era poco proclive a los intereses de sus moradores. Técnicas (abancalamiento y riego con aguas de avenida) que tuvieron su mayor expansión en el setecientos y en el último tercio del siglo XIX, coincidiendo con períodos de crecimiento demográfico. Aumento de la población que implicó un incremento notable de las tierras dedicadas a la agricultura pues debido a la escasa productividad de la época, el aumento de la producción sólo se lograba al ampliar la superficie cultivada lo que supuso una merma considerable de la vegetación natural y la puesta en cultivo de numerosas zonas montañosas hasta el umbral térmico de tolerancia de los cultivos que allí se instalaron, como sucedió en la montaña alicantina.

La introducción de usos inadecuados, la destrucción de estos abancalamientos o su no reparación no son fenómenos limitados a la segunda mitad del siglo XX cuando estas zonas se desorganizan al sufrir un intenso éxodo rural paralelo a la instauración de la economía de mercado, sino que en el setecientos estos fenómenos ya se manifiestan con gran virulencia. Situación que será denunciada por los ilustrados tanto a nivel individual como colectivo quienes propugnarán una nueva ordenación de los espacios agrarios, la defensa de las superficies arboladas que se convierten en sectores en claro retroceso o la sustitución de los sistemas de tenencia para intentar reducir los efectos ocasionados por una inadecuada dirección de las aguas, y para aumentar los rendimientos agrícolas.

Estos postulados son reflejo de un movimiento más amplio (Ilustración) en el que la razón, la protección de la naturaleza en todos sus aspectos es concebida como un sistema y con unos planteamientos conceptuales que gozan de una gran vigencia en la actualidad. El compatibilizar el desarrollo económico y la tutela de la naturaleza como una teoría con cierta difusión entre los intelectuales, gobernantes o planificadores, sin embargo, no será retomada hasta mediados de la década de los setenta y tras un período de desarrollismo (años 50 y 60 del siglo XX). Afirmaciones todas ellas que confirman la antigüedad de una concepción ambientalista frente a unas posturas que pretenden ser "nuevas" y que en gran medida fueron ya planteadas en el siglo XVIII.

Objectivos y metodología.

La finalidad de este trabajo será analizar la evolución de estos espacios y una vez establecidos los principales factores que han originado su abandono y, como consecuencia de éste, la intensificación de los procesos erosivos, elaborar un programa de planificación y ordenación territorial. Planificación basada en una política de conservación o mejor de reintegración de estos espacios a su ambiente natural mediante la introducción o recuperación de una serie de actividades, único modo de evitar el éxodo de población de estas zonas, y por tanto, de reducir los actuales desequilibrios territoriales existentes entre las diversas comarcas valencianas.

Objetivos que se lograrán a partir de unos métodos entre los que destacan: trabajo de campo, análisis de los catastros y la fotografía aérea (vuelo de 1956, 1978 y 1985) e imágenes de satélite. Sin embargo, se recurrirá a todas las fuentes documentales que aporten información sobre las modificaciones del paisaje agrario y entre los que cabe destacar los archivos, muy necesarios para realizar un pequeño bosquejo acerca de su origen y etapas de configuración.

Configuración de los espacios agrarios.

Tradicionales.

Las regiones del Mediterráneo occidental han conservado, hasta comienzos de este siglo, unos modos de gestión del agua que pueden calificarse como precapitalistas. Establecidos desde la antigüedad en las zonas de regadío tradicional se caracterizan, en primer lugar, por las tecnologías empleadas, las cuales, aunque seculares y a menudo ingeniosas, son poco eficaces y frágiles. Espacios que serán insuficientes para abastecer a la población debido al crecimiento demográfico del setecientos: el terrazgo cultivado se extenderá por glacis y piedemontes (segunda etapa) e incluso por las laderas montañosas. Las regiones mediterráneas entran en la era de la gran hidráulica (conjunto de innovaciones tecnológicas que contribuyen a un control eficaz y de envergadura de los recursos hídricos) como muy pronto en los últimos años del XVIII, aunque generalmente lo hacen a partir de la segunda mitad del XIX e incluso en los primeros decenios de nuestro siglo. Así, los grandes embalses de retención, al almacenar los caudales y regularizar los débitos a lo largo del año o la aparición de aparatos elevatorios, permiten extender las superficies regadas y desarrollar los cultivos intensivos. Según su aprovechamiento distinguiremos entre regadíos tradicionales, secanos y montes.

Los *regadíos tradicionales* (5-10% de la superficie cultivada) se localizaban en los llanos de inundación de los ríos alóctonos o de ríos-ramblas con alguna circulación estacional de aguas. Ubicación que generalmente correspondía con tierras palustres, algunas de las cuales fueron bonificadas en el siglo XVIII como las Pías Fundaciones del Bajo Segura (Alicante).

Secanos (a finales del siglo XIX suponían las nueve décimas partes de la superficie cultivada). En una sociedad tradicional, donde la agricultura es la base económica, suelo y agua adquieren particular relevancia. Cuando el medio no oferta, en la medida suficiente esos elementos, intentar mantener uno y acrecentar el otro, es la máxima que ha guiado las actuaciones del hombre en estas tierras semiáridas; por ello el agricultor ideó sistemas para la captación y la retención de las escasas precipitaciones, a fin de asegurar las cosechas. Dos son los métodos utilizados: el cultivo en terrazas y el riego con aguas de avenida.

El beneficio que para los terrazgos suponían estas aportaciones, les otorgaban un *status intermedio* entre las tierras de regadío y las de secano, lo que queda plasmado en las escrituras públicas al pagar una mayor contribución que el resto del secano y apareciendo

con esta distinción en los amillaramientos. De la importancia que estas escorrentías esporádicas tenían para el agricultor en épocas pasadas da idea Cavanilles, quien a fines del siglo XVIII, escribía con relación a la zona de Agost (Alicante) lo siguiente: "quien ignore ser suma la escasez de agua en aquella parte del reyno, y que á veces un solo riego basta para asegurar y aumentar las cosechas, extrañara ver salir los labradores hacia sus haciendas cuando empieza á tronar, ó amenaza alguna tempestad: los truenos, que en otras parte del reyno sirven de señal para retirarse ásus habitantes lo son aquí para desampararlas y salir en busca de las aguas y deseado riego: se fecundan entonces los olivos, higueras, almendros, viñas y algarrobos: y el suelo entera se mejora con el cieno que traen las aguas".

Los *montes* supusieron siempre un espacio que proporcionaba unas rentas adicionales a la economía agraria (aprovechamiento silvo-pastoril y energético). El monte ha sido tradicionalmente objeto de ordenación positivos, es ahora cuando presenta una situación de marginalidad donde sólo se valora su aspecto ecológico, pero sin que reciba toda la atención que necesita para procurar su crecimiento ordenado y racional de acuerdo con lo que constituye su herencia biológica y cultural.

Sin embargo, desde hace una treintena de años, el contexto general de las economías mediterráneas se ha trasformado profundamente: la industria y los servicios empiezan a detentar la primacía frente a la agricultura. Mutaciones que han provocado un rápido aumento de las necesidades domésticas e industriales de agua, y a éstas hay que unir el desarrollo espectacular del turismo, que ha supuesto un nuevo aumento del consumo de las demandas urbanas, en particular durante los meses cálidos y secos del verano. Estos nuevos usos del agua han entrado en competencia con los regadíos agrícolas, que a menudo malgastan agua y son menos rentables que las utilizaciones industriales o turísticas.

Los espacios mediterráneos registran de diversas formas estas transformaciones. En la parte alta de las cuencas, los valles entre montañas, cuyas fuentes y verdura hacían soñar en el pasado, están ahora en trance de abandono: las redes de regadio, las terrazas y las plantaciones ya no se cuidan. En las partes bajas, la huerta secular languidece a causa de la polución (las aguas de acequias y azarbes evacuan los residuos industriales y los detergentes domésticos, empleo excesivo de tratamientos químicos) o el terreno agrícola es roído por la multiplicación de construcciones. El paisaje regado ya no es más que la imagen obsoleta de una sociedad que ha dejado de ser agrícola. Estos nuevos espacios no tienen como función fundamental el sacar partido del agua por medio del regadio y la producción agrícola sino hacer fructificar los capitales, habiendo reducido la parcela agrícola a un soporte material que vale más por su situación que por su dotación en agua. El capital se ha convertido en el modelo de producción preponderante, relegando a un segundo plano el factor trabajo y los recursos hídricos.

Situación actual.

Los sistemas de uso tradicionales venían acompañados por una determinada organización de las aguas a fin de laminar las crecidas y aprovechar al máximo ese preciado recurso de modo que si se abandonan, se agravan algunos problemas ambientales que éstos intentaban minimizar. En unos casos, esta degradación deriva del olvido en que las nuevas condiciones económicas y el nivel técnico impone a los aprovechamientos tradicionales (los modernos utillajes no puede acceder a las terrazas situadas a mayor cota), mientras que en otros las modificaciones las introducen actuaciones recientes, en una nueva fase de capitalización de los recursos, con la asignación de usos especulativos (agricultura intensiva y la función turístico-residencial) ante los que los cultivos de secano no puede competir. Se produce, con ello, una emigración de mano de obra desde las tierras semiáridas del interior hacia el litorales; es en definitiva, el inicio del declive de la agricultura de la montaña.

Este se manifiesta, en primer lugar, en la rotura de los muros de contención que, antaño eran reparados tras cada aguacero, por lo que el suelo de la terraza tan trabajosamente creado se pierde ladera abajo tras cada precipitación. Resultado es la aparición de formas de modelado (cárcavas, procesos de *piping*, etc) expresivos de la agresividad e inestabilidad de las vertientes lo que se traduce en que las aguas adquieran una elevada capacidad de competencia y carga que es depositada, casi siempre, en aquellas arterias de mayor entidad, en los embalses que ven disminuida progresivamente su funcionalidad o en los llanos de inundación por el desbordamiento de las aguas. Hecho que aunque a priori parezca positivo por lo que ello significa de renovación de suelos, no lo es tanto en este sector de la cuenca donde la ocupación humana alcanza mayor densidad. Consecuencia derivada, asimismo, del abandono de abancalamientos y riegos de turbias, es el considerable aumento de la velocidad y de los caudales que hoy, circulan y llegan hasta los tramos bajos de los cursos fluviales cuando se producen chubascos de fuerte intensidad. En efecto, las aguas de escorrentía, antes retenidas en las parcelas y desviadas por presas y boqueras hacia los terrazgos agrícolas de secano, corren hoy libremente hasta los cauces, de manera que ha desaparecido, en gran medida, el beneficioso efecto de su laminación.

Un paisaje que ha tardado siglos en configurarse, que es el resultado del esfuerzo y sacrificio de muchas generaciones, se está desmoronando con tal rapidez que, si no se adoptan las medidas oportunas con prontitud se perderá irremediablemente.

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TOWARDS AN ECONOMIC REALLOCATION OF BLUE NILE WATERS

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Many areas of the world are now suffering from water shortages brought about primarily by rapid rises in population. Nowhere in the world is this situation more acute than in the Middle East. The shortage of water in the region has been the focus of much attention for the last two decades. The Nile basin, in particular has received much attention in this respect.

Whilst most sensible opinion accepts that armed conflict over water in the basin is unlikely, due to the fact that states (particularly Egypt) have been adjusting to water scarcity for years, the riparians face a serious challenge if the needs of all are to be accommodated.

When one looks at the demography of the Nile basin states, one can see why politicians in many states have been anxious to secure adequate fresh water resources. By 2025, Egypt's population it is estimated, will be 110 million and Ethiopia's will be approximately 120 million. With this as an overriding priority, Egypt has always insisted that the 1959 Nile Waters Agreement (NWA) is final and binding. This agreement allocates 55 km³ to Egypt and 18.5 km³ to Sudan, leaving the other riparians without an allocation.

Since the end of the Cold War regional politics especially in the Blue Nile basin have altered significantly. With the fall of the Mengistu regime in Ethiopia, relations with Egypt have warmed to the extent of Egypt pening bilateral negotiations with Ethiopia, who has in turn been in negotiation periodically with the Sudanese government (an action which is forbidden under the 1959 Nile Waters agreement). If one also considers that financing institutions such as the World Bank require agreements between riparians before committing funds to projects, one can see that without cooperation amongst riparians, development in the basin will be severely restricted without a re-negotiation of the 1959 Nile Waters Agreement.

Regional planning

Today, the idea of viewing a river basin as a closed system in anything but hydrological terms is largely redundant. In the case of trans-boundary water resources, it would seem rational to conduct water planning at a wider scale as economic and geographical linkages between parts of states that are outside the basin impact on other riparians economies. Therefore effective water planning would require consideration of the wider national and regional economies.

To achieve a situation where planning at this level could occur, would require unprecedented cooperation between the Blue Nile riparians. An agreement between all the riparians on how to maximise the economic benefits of the resource would require that all riparians had equitable standing with regard to Nile waters and would thus require a re-negotiation of the 1959 Nile Waters Agreement.

Much work on the shape of a possible new NWA has been carried out at the department of Environmental Science and Regional Planning at the University of North Carolina and this section draws heavily on the work of this department (Whittington *et al.*, 1993). The first of these is the exploitation of joint gains. By this the authors emphasis is placed firmly on augmenting the supply of water within the basin. The main method of achieving this would be the transfer of much of the storage of Lake Nasser upstream to the Ethiopian Highlands.

Rough estimates suggest that given the lower potential evaporation rates of this area and the smaller surface to volume ratio of the reservoirs, created by the steep sided valleys of the Blue Nile tributaries a saving of between 4 and 5 km³ per year could be made. This is equivalent to a 50 per cent of the evaporation losses from Lake Nasser, which are estimated "at roughly 10 km³". The authors also suggest that the unused Jebal Aulia dam should be closed which would save another 2.8 km³ per year. Whilst at first these water savings seem attractive, both suggestions create other technical problems. The transfer of storage from Lake Nasser would mean a reduction in the hydropower production of the Aswan High Dam, this problem however is not insurmountable, as there are other significant sources of energy within the basin.

The capital investment to build the infrastructure necessary to achieve these water savings would run into many tens of billions of dollars and would make this new water prohibitively expensive for use in arid zone irrigated agriculture. If this water was to be allocated to sectors of each riparians economy where it would bring the greatest economic return, which would preclude its use in agriculture, then the creation of 6-7 km³ of new water would be an economically beneficial and positive starting point for a new NWA.

Regional Water Markets

Efficient allocation of present and new Nile waters could be facilitated by another of the core principles stipulated by Whittington *et al.*, that is the establishment of a regional water market. A water market entails "the annual or permanent transfer of water rights at a cost that takes into account potential supply and potential demand and the cost of providing additional infrastructure to deliver the water to the new user."

Economists agree that the primary achievement resulting from the establishment of water markets in general, is an increase in the efficiency in water use. If water is to be sold to the highest bidder, then by necessity that user must aim to achieve the maximum possible benefit from the water bought. As Simpson says "Experience has shown that users of water use rights are fully capable of making sound business decisions regarding their own assets". Thus in the context of the Blue Nile basin, one would assume that particularly in the case of Egypt, water would be allocated first to municipal and industrial uses rather than to agriculture. Whittington *et al.* suggest that another advantage of a water market for the Blue Nile riparians would be the ability to practice severe and effective demand management in times of drought by pricing water too high for all but essential uses.

Regional Trade Agreements

Perhaps the most promising area for development that could be incorporated into a new NWA is a wider agreement that takes into account non-water issues. There are considerable opportunities for economic cooperation among the Nile riparians, an integrated economies approach to managing the basin which would mean that the new NWA would in fact be much more far reaching and would take the shape of a regional trade agreement.

Today one can see an emerging pattern of regional and inter-regional trade areas with preferential terms of trade for those included in them. Regional integration has been a continued and now an accelerating trend since the end of the Second World War (De la Torre and Kelly, 1992). Probably the most significant development at the global level is the emergence of the European Union as a vast trading unit.

One of the undrelying forces behind the original conception of the European Economic Community was to integrate the European economies together in order to reduce the risk of conflict on the continent. Whilst one cannot draw a direct parallel between Europe and the Nile Basin, surely the demonstration that such cooperation is possible (and is being repeated

globally), merits an investigation of the possibilities of such economic integration within the Nile Basin.

De la Torre and Kelly (1992) provide an analysis of the possible costs and benefits of regional economic integration. Their analysis breaks down into two distinct sets of features of regional economic integration, those of static costs and benefits (through trade creation and diversion) and those of dynamic costs and benefits.

Static Benefits, Dynamic Benefits and Trade Creation

Perhaps the most obvious area in which trade creation (static gain) could take place is in the production of hydroelectric power (HEP). Ethiopia's potential for generating HEP has been recognised for some time. It is estimated that Ethiopia possesses 53 per cent of the HEP potential of the entire Nile basin (Waterbury, 1987). Abate (1994) states that the hydropower development plans being formulated by Ethiopia at present are with a view to becoming a major exporter of power. De la Torre and Kelly also identify a number of ways in which regional integration may also lead to a "sustained increase in the rate of growth of income" (Dynamic gain). The causes of these gains are attributed to several factors which are again of relevance to the Blue Nile catchment, they are: economies of scale, spill over effects (such as technology transfer), increased competition, a more attractive climate for investment and the speeding up of technological change. According to their analysis, a larger regional market may provide opportunities of economy wide economies of scale and when linked with regional cooperation would also provide economies of scale within infrastructure such as transport and communications networks.

In the context of the Blue Nile catchment one could see that the possibility of achieving economies of scale in a large regional market, that is predicted to reach around 300 million by 2020 could be enormous. This would be particularly true if as foreseen each country fulfilled a specific economic role (efficiently) then the interaction between an increasingly urbanised and industrialised Egypt would provide industrial and consumer goods to the predominantly agricultural upstream states who in turn would produce the surplus food and power demanded by such an urban population. Also a regional trade agreement by providing a more secure regional framework would reduce tensions that exist between these four riparians and would improve the climate for much needed investment not only from within the member states but also from international sources.

Conclusion

It has been shown that the possibility of wide scale economic integration within the Blue Nile basin still seems a remote prospect. However, as has been argued, there are numerous advantages for all riparians in such cooperation. The prerequisites for an agreement would require the resolution of the long running conflict in Sudan. There would also have to be an unprecedented amount of transparency between water planners in all riparian states.

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WATER RESOURCE ALLOCATION AND MANAGEMENT IN A MULTI-ETHNIC STATE: THE CASE OF ETHIOPIA

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State development of water resources is determined by strategies of political control which affect, social and economic groups within society. In a multi-ethnic state such as Ethiopia ethnicity has become an expression of right to territory and, by implication, resource use.

Introduction

Ethnic identity has become a potent force in claims to territory and resources, replacing ideology and simultaneously challenging state legitimacy (in the control and distribution of resources).

Ethiopia

Competition for resources in conditions of increasing scarcity shapes the confrontation between individuals, groups and the state. The new federal structure in Ethiopia seeks to reduce intra-societal conflict and settle claims to territorial control given that the key to the acquisition of material and social resources is found in the political realm (Markakis, 1994). In the new 'consensual' politics, ethnicity, as a power resource, will help to guarantee political success.

Resource Dilemma

Ethiopia has more water than it needs at present levels of consumption assuming 'rights of water usage' and that the supply, as currently managed, is fully utilized. Of an estimated annual average surface water supply of 111.6 km³ (54.4 km³ of which are believed to be exploitable) approximately 100 km³ or some 90% of the total water supply is cross-border. Of 14 river basins in Ethiopia 11 are international; the Blue Nile (*Abbay*) is greatest in volume supplied to downstream states and in its regime development. Most of the total annual supply flows to other countries, and no more than 2-3 km³ is currently utilized for irrigation.

Ethiopia has an estimated annual 500,000-ton structural food deficit and periodic drought severely reduces the productivity of peasant rain-fed and pastoral modes of production. The quantitative increase in demand for food has been mirrored by erosion of highland agricultural land. Estimated annual top soil removed from the Ethiopian Nile Basin watershed alone is 1.3 billion tons per year.

By 2025 the population of the country is expected to be 100 million and yet between 1980 and 1988 agricultural production declined by an estimated average of 0.6% a year. The economy is, nevertheless, still largely agricultural, contributing some 40% of GDP, 90% of exports, and providing 85% of total employment and 60% of export earnings.

More than 50% of the irrigated area in Ethiopia uses water drawn from rivers which flow wholly within Ethiopia. Future irrigation development will have to use water from rivers which flow across the country's borders, thus: "equitable water sharing arrangements will need to be established with the relevant riparian countries at an early date." (ONCCP, 1990).

Of Ethiopia's 14 river basins, furthermore, 9 cross two or more of the new autonomous regions (Asfaw, 1993).

The Context of Ethnicity

A 'multi-ethnic state' of some 60 different ethnic groups or 'nations', Ethiopia's present government is dominated by the Tigrayans - numerically small - whereas the numerically largest and most geographically dispersed group (the Oromo) and the previously dominant ruling group (the Amhara) who together constitute some 60% of the population, remain largely outside of the state decision-making apparatus. Ethnicity is a key determinant in the political structure of the country. Yet identity in terms of kinship, religion or language is often insufficient as a defining characteristic: indeed, whether 'ethnicity' is categorized as an "explanatory principle, a determined force of social life, or a category of belonging determined by other forces, relations, structures and so on" (Abdalla El-Madani, 1989:2), affects the social space which a particular group is said to inhabit. Uneven economic change may itself have "created many of the conditions for the growth of modern ethnicity" according to Clapham (1994:34), implying that ethnicity is a dynamic process as well as a descriptive factor.

Under Mengistu the state sought legitimacy through an ideology which obscured "a narrow cultural chauvinism" and control over the state. Antagonism that developed between the ruling classes and society - particularly on the lowland periphery - precipitated nationalist opposition to the 'centre' (Markakis, 1978:66), and in controlling resources, the state limited resource access by peripheral groups increasing economic disparities.

The delineation of 14 ethnic regions as units of autonomy has explicitly defined the right to territory, ethnically, and, therefore, implicitly defined resource control, territorially. Control by the state must now be indirect and based largely on control of representation and participation in regional and national institutions. "The extent to which policy options... are determined not by the needs or desires of the government's constituencies but by the state's ability to extract resources and otherwise coerce its population is particularly important where the imperatives of development foster great ambitions on the part of state elites." (Anderson, 1987:14). If such a developmental imperative exists with the current Ethiopian state one may substitute means of co-option, for coercion, and conjecture that through the state's organization (via client 'ethnic sub-groups') of ethnically-based regional political parties it will control resource development.

Historical expansion of state power led to conflict with lowland pastoralists, including the Afar, for whom the imposition of agricultural corporations in the Awash valley in the 1970s and 1980s represented a challenge to their livelihoods. In the transformation of their resistance to state intrusion into incorporation within the state structure, power relations for the Afar (and others) became a set of "exchange relationships... both among groups themselves and in the state's management of inter-ethnic relations - including conflict." (Krymkowski, D. and Hall, R., 1993:321). If ethnic autonomy in Ethiopia acts as a means of conflict resolution "by allowing those political forces excluded from power at the top the opportunity to exercise regional power" (*ibid.*) (i.e. removing opposition), then the future exercise of this power over water resources may reveal the (real) articulation of state-society relations.

Water Resource Management

The two key issues are the provision of effective institutional mechanisms between regions and central government; and effective cooperation with resource-sharing states. Regional development and management of water resources has to be congruent at the local,

regional and national levels. Proclamation No. 7 of 1992 (chapter 2, part i., article 9/1) stated that the new regional administrations would have, *inter alia*, the following powers: legislative, executive and judicial powers in respect of all matters within their geographical areas *except such matters as ... economic policy, [and] establishing and administering major development establishments*, which are specifically reserved for the Central Transitional Government because of their nature." (Quoted in Asfaw, G., 1993; emphasis added).

The special powers of the National/Regional Transitional Self-governments would also be "to administer, develop and protect the natural resources of the region in accordance with relevant general policy and law of the Central Transitional Government" (*ibid.*:1993).

The previous absence of appropriate policy guidelines has hampered the development of water resources in general, and irrigation in particular (ONCCP:1990). A state structure which significantly complicates the institutional control of social and political processes involved in the formulation of policy guidelines between ethnic regions as well as between regional and central institutions, will mean that a national strategy for negotiations with downstream riparian countries will become imperative.

Such negotiations, should take place in "sufficient time to avoid delay to the development process" (ONCCP:1990). The question is in which regions will resource development take priority and how will ethnicity as a political resource (factor) affect this process.

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WATER USE EFFICIENCY IN DELTA EGYPT

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Introduction: the regional setting

Following the completion of the Aswan High Dam in 1968 it was felt that man had overcome the destructive pattern of annual floods and created a reliable storage capacity to overcome long-term fluctuations. However recent trends suggest the possibility of a significant decrease in the river's overall discharge (Folland *et al.*, 1986; Allan and Howell, 1990). This suggests that not only is Egypt already facing annual water shortages for the expansion of cultivated area but that it may consider a reduction in the irrigated area.

A large percentage of agricultural land is suffering from water logging and salinity problems (up to 33% of the delta affected). Farmers complain of shortages in specific locations along canals, or at particular times within the irrigation cycle (Metawie, 1989). This is a result of the inefficient use of the available water supply and the over application of water at the local level. Through a case study I have sought to outline the causes and extent of wastage/inefficiencies in the distribution of irrigation water in rural Egypt.

Location of the village and irrigation organisation

Fisha al-Sughra is a small village with a population of 6,000 located 80 km NW of Cairo, in the governorate of Minoufia (Fig. 1). It represents a typical agricultural region with a mixed cropping pattern reflecting the general pattern for the Delta. The principal crops are wheat and *berseem* in the winter and maize in the summer.

The main canal serving the study region is the Tilwana which off-takes from the Minoufia main canal and serves 10 distributary canals on a two turn rotation (top 5 on bottom 5 off and *vice versa*). The Shahabiya canal, serving the study *mesqa* (branch canal) is located along the upper portion (Fig. 1). The discharge into the distributary canals is maintained by levels rather than measurements of discharge and is the responsibility of the District Irrigation Office. There are no direct controls of discharges by the Ministry of Public Works and Water Resources (MPWWR) below the main canal.

The district office has no permanent representative at the village and is responsible for 70,000 feddans (40 villages). The office for the study site, located in al-Bagoor, was staffed by the district engineer and 5 water guards (*bahhar*), responsible for operating the rotations along the main canals and ensuring that during an on-period water is supplied to no more than 80 cm below ground level; however, they rarely visit the canals and levels are not recorded on a daily basis. Being no permanent representative at the village level there is poor communication between farmers and the MPWWR.

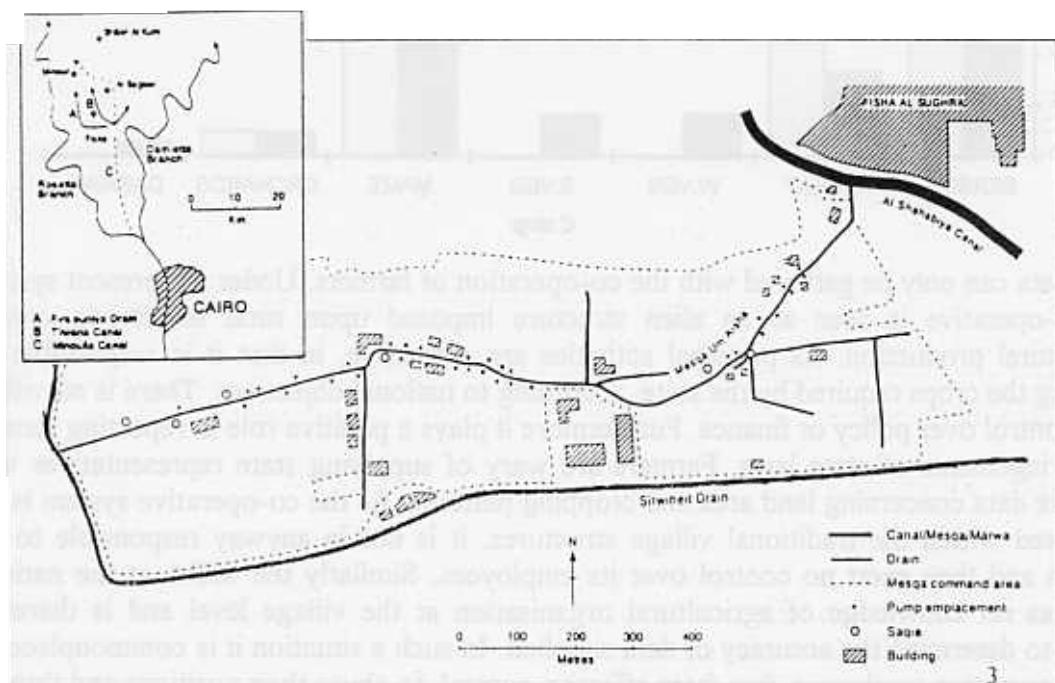
The study *mesqa*, Um Aisha, irrigates 174 feddans and 334 farmers. It is supplied by continuous flow from the Shahabiya during on-periods and supplemented by a government ground water pump located 500 Mt. upstream of the *mesqa* inlet. The *mesqa* exhibits a relative surplus over the year, as the majority of canals and *mesqa* in the region.

Problems of irrigation supply

The basis from which irrigation demands are calculated is the national cropping pattern, collected by the Ministry of Agriculture (MOA) through the village co-operatives. For Fisha

al-Sughra the official cropping patterns bore only a general relationship to the actual patterns. Land area was overestimated by around 5%, due to inadequate updating of records through negligence or to corruption governing the transferral of agricultural to residential land. If such inaccuracies were transferred to the national level, there would be a national overestimate of the agricultural land of 250,000 f.

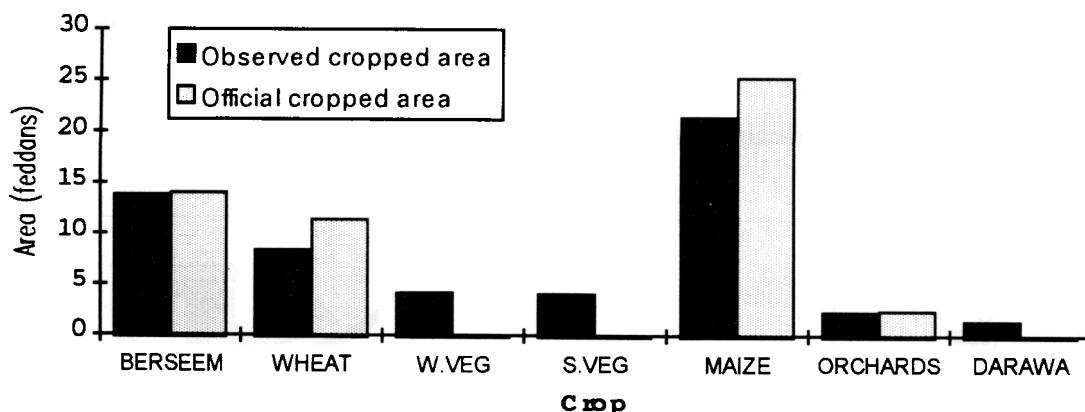
Fig.1: Principal canals and drains serving the region of Fisha Al Sughra



In addition there was only a general recording of cropping patterns, consisting of maize, wheat, *berseem*, cotton. Minor vegetable crops were not recorded, nor the short *darawa* fodder crop, from October to December (Fig 2). Such inaccuracies give rise to variations in requirements between the actual and official crop water requirements. During the *darawa* season, a deficit of 22% of requirements would be experienced if the official requirements were to be applied. Furthermore the use of regional cropping patterns as a basis for deciding water requirements ignores the canal/*mesqa* variations in requirements. Co-operative districts, which form the basis of MOA data, contain a number of canals and *mesqa* and in collecting crop data no effort is made to note the location of crops along canals. Thus a canal mainly devoted to a water demanding crop and a canal dominated by a crop with a low water requirement may receive equal inflow, if they fall within the same co-operative district. Finally it was noted that the optimal planting and harvesting dates were assumed to be valid for the various regions, yet observations indicated that they would often be delayed or put forward by up to one month as a result of localised factors.

A final error made at the national level was the delivery efficiencies of the system. A canal conveyance efficiency of 80% is assumed by the MPWWR, although my observations suggest 65%. The poor farm to field efficiencies suggested by the MPWWR (75%) were not observed and detailed measurements revealed an average efficiency of 81.6%. Although these differences resulted in similar overall system efficiencies and therefore would not greatly affect the calculation of requirements, they are indicators of where the MPWWR places blame for losses and where it should be truly located. Any assumptions must be supplemented by accurate data of actual cropping patterns and farmers practices.

Fig.2: Officially recorded and observed cropped area, Um Aisha, Fisha, 1990-91



Such data can only be gathered with the co-operation of farmers. Under the present system, the co-operative is seen as an alien structure imposed upon rural society to control agricultural production. Its principal activities are extractive, in that it is responsible for ensuring the crops required by the state, according to national objectives. There is no village level control over policy or finance. Furthermore it plays a punitive role in reporting farmers for infringements of state laws. Farmers are wary of supplying state representatives with accurate data concerning land area and cropping patterns. As the co-operative system is not integrated within the traditional village structures, it is not in anyway responsible to the farmers and they exert no control over its employees. Similarly the MOA at the national level has no knowledge of agricultural organisation at the village level and is therefore unable to determine the accuracy of data supplied. In such a situation it is commonplace for the co-operative employees, free from effective control, to abuse their positions and through a combination of neglect and corruption supply incorrect data.

Mechanisms governing the distribution of irrigation requirements

The data collected are used by the MOA for national projections of cropped areas and by the MPWWR for calculating total crop water requirements. However officials at the MPWWR are aware that whilst in general terms such data might give an adequate picture of national water requirements, they mask a high degree of error. As a result the MPWWR has a policy of committing releases into main canals well in excess of the requirements calculated. The ministry, admitting that it has little knowledge of water requirements at the local level, relies instead upon the maintenance of releases based upon canal levels, ensuring that during any on-rotation water is available to a predetermined height. No measurements are made of how accurately water is divided between minor distributary canals nor of the quantity of through-flow passing from the system to the drains. Knowledge of releases into lower level canals is further obscured due to the imprecision in recording of water levels. My own measurements indicated that the official levels recorded for both of the distributary canals within the study area displayed a high degree of error.

Operation of the irrigation system at the lower level is in the hands of the district *muhandis* and his small staff of *bahhar*. Releases in general to the principal distributary canals in the region, far exceeded the water requirements and as a result subsequent diversions into *mesqas* provided more than adequate supply. However a number of *mesqa* received discharges below the crop water requirements (Radwan, 1994). Um Aisha *mesqa*

had an annual discharge which was 64% in excess of the observed water requirements (taking into account distribution requirements and canal storage capacity). It supplied discharges twice the crop requirements for six months in the year and slightly below requirements for three months (during the *darawa* fodder season).

Problems of surplus

Relative surplus flows as experienced along Um Aisha *mesqa* were a feature of the majority of canals and *mesqa* in the region. This is a consequence of the present supply system which seeks to meet peak demand levels. Much of the resulting through flow enters the drains and can only be partly recovered due to the problems of cost and quality. On most days during an on-period tail levels reached the spill-level and the flow in the canal was close to that at the spill-way indicating that there was little draw down from irrigation.

As a result of the high canal levels a number of farmers at specific locations could often irrigate by gravity flow. However such irrigations were often ahead of schedule. Prolonged surplus flows damaged embankments and many farmers complained of seepage into their fields; farmers are obliged to reinforce canal embankments and field inlets. Sometimes they illegally opened the tail end gate on the Shahabiya to remove surplus water and this brought them into conflict with the *bahhar*. Formal complaints rarely go beyond the district level: the farmers affected are few and co-operation is limited to physical support in opening the tail-end gate and verbal support in altercations with the *bahhar*.

Problems of shortage/Farmer coping mechanisms

Shortage occur along a small number of *mesqa* due to localised factors and farmers responded by elaborate co-operation. Such problems were seasonal and connected with the winter closure (15/1-19/2). As most farmers had anticipated the annual closure it did not present a major problem. Crop requirements at that time were low and there was a likelihood of rainfall. Most farmers used this time to perform a number of annual activities, most importantly *marwa* maintenance was completed. Some farmers required additional irrigations; some growing *berseem* had not cut the crop prior to the closure and following the subsequent cutting they needed to irrigate. They were located along the Shahabiya canal and were able to tap into the dead storage with pumps. A more serious problem arose for a group of farmers along Um Aisha who had recently planted vegetables. They could obtain additional water by bribing the *bahhar* who operated the ground water pump along the Shahabiya. The formal authorisation would have been too long.

Farmer use patterns

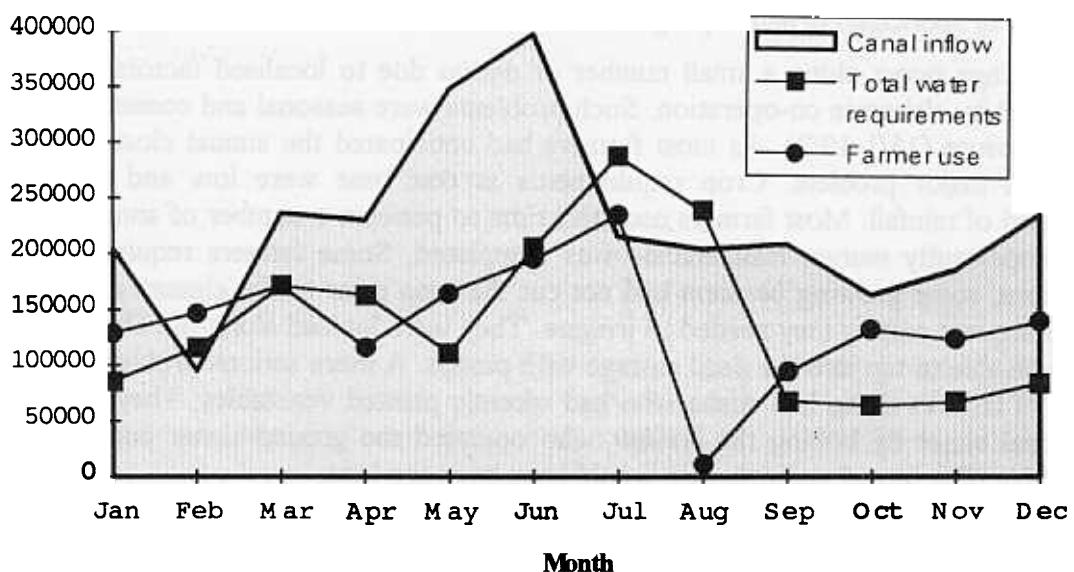
The standard response of most employees of the MPWWR when questioned on oversupply is that it is a result of farmer over-use at the *mesqa* level. However an analysis of patterns of demand revealed that levels of farmer use were extremely close to the optimal water requirements and that they achieved a high degree of efficiency in raising water. Losses were observed as a result of seasonal factors due to the specific cropping patterns and actual planting and harvesting dates and due to the mis-match between the rotational and daily supply and demand patterns. The present regime of supply is unable to respond to any fluctuations in demand; which is subject to a wide range of social, physical and other influences. Therefore the supply patterns needs to be closer to the demand. This requires some form of localised and flexible control in that it should be capable of responding within a short period (24 hours) to farmer demands.

Calculation of total water requirements

Measurements of inflow and farmer use patterns were contrasted with calculated crop water requirements, based upon local data of cropping patterns, planting and harvesting dates and physical characteristics. Although those derived from my own data differed little from the officially derived figures, there were important differences: State figures overestimated the total land area, because land converted to buildings was not registered for up to 5 years. In many cases officials at the co-operative were bribed to overlook such changes in land use on other occasions it was probably due to negligence.

The effect of this overestimate was negated by an underestimate of the cropping intensity as the co-operative failed to record the full extent of area devoted to vegetables and *darawa* fodder: the total cropped area was 369 f and the official figure was 354 f. Government underestimates of losses in the main canals were balanced by overestimates of losses by farmers transferring water from the canal to the field along field ditches (*marwa*). The overall conveyance efficiencies calculated in the region were 54% as opposed to an official figure of 55.1%. Whilst farmer use patterns exhibited a high degree of correlation with estimated total water requirements, actual releases into the canal were much higher than required. This is largely due to the mis-match of the supply and demand patterns and the need to ensure that sufficient water is available when farmers need to irrigate (Fig. 3).

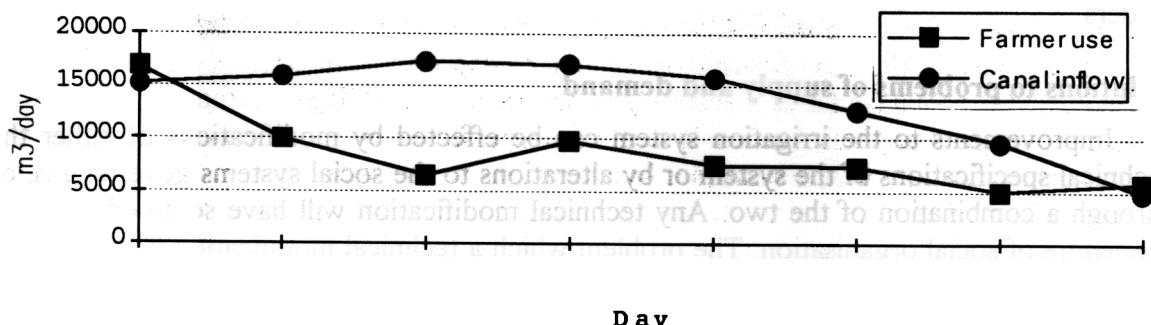
Fig.3: Total water requirements, farmer use and canal inflow, 1991



Rotational use patterns

The pattern of demand during a typical on-rotation begins with a high initial demand gradually falling off to a low level at the end of the on-period (Fig.4). During the high demand period there is a degree of enforced scheduling and farmers reliant upon the *saqia* (water wheel) or tail end farmers are at a disadvantage. During the middle of the on-period there are few constraints and those farmers irrigating tend to delay irrigations. By the end of an on-period demand there is little although when the on-period extends beyond the standard there would be an increase in precautionary irrigations. This was due to farmers fears that the off-period may be similarly extended.

Fig.4: Rotational supply and demand patterns. Average for all on-periods 1990-91



Seasonal use patterns

The most important seasonal discrepancies between supply and demand were as a result of the variance between the official cropping patterns and dates and those actually observed. From August to September there was little demand for water. The maize was left in the fields for an extended period without water, but most farmers insisted it improved yield and helped harvesting. The extension of the maize season resulted in the delay of planting *berseem* or *darawa* until late September; so, much of the inflow during this period was not utilised. In April extra water releases were made along all canals in the region for the cotton requirements. However no cotton was grown along the Shahabiya or any of its *mesqa*. Most farmers were growing wheat and this like maize required a pre-harvest drying-period.

Diurnal use patterns

The supply pattern is more or less constant throughout the on-period and therefore throughout 24 hours, however the majority of irrigations occurring from 5 to 11 am. Peak demand discharges are well in excess of average supply discharges (making use of canal storage capacity). During the period of peak use a number of farmers are prevented from irrigating, due to the lift technology employed (*saqia*) or the location along the canal (tail-end) and postpone irrigations. Even where they are able to irrigate all farmers will pay a greater price at peak periods due to the increased head lift, mainly at the tail end.

If supply matched more closely the demand patterns, canal levels would be constant. Farmers would pay broadly similar costs to irrigate. It would be possible to reduce total inflow and waste. It would be unlikely that demand patterns (seasonal or daily) could be greatly modified and the change must therefore occur in the supply pattern. This can only be the case if farmers are involved and have some control over inflow.

Other social factors influencing demand patterns

The daily use pattern reflects the normal farmer activities. On a number of occasions these were modified. The most important are the month of Ramadan and Friday, the day of congregation. During Ramadan farmers commenced irrigations as early as 2 am due to many farmers remaining awake into the night and completing agricultural activities during the 'eating hours'. It was common for farmers to sleep through until 9 or 10 am and few irrigations occurred at that time. All activity in the fields was curtailed shortly before sunset at around 6 p.m.

It was expected that Fridays would show an overall reduction in the level of irrigations, but this was not the case. However almost no irrigations occurred from 11 a.m. to 2 p.m. for the study year (this representing the time for the congregational prayer). Other

occasions included the Eids or festivals upon which virtually no irrigations occurred. Market day was also observed (Monday) although there was no noticeable difference, probably because women generally attended the market and males present tended to be out of town traders.

Solutions to problems of supply and demand

Improvements to the irrigation system can be effected by modifications of either the technical specifications of the system or by alterations to the social systems governing it, or through a combination of the two. Any technical modification will have some effect upon the nature of social organisation. The problem which a technical modification is intended to solve may be related to the social mechanisms governing the system and thus the technical solution may not achieve the desired objective. If consideration is not given to the required modification of the social mechanisms, following an alteration of a specific technical feature of the irrigation system, the desired improvements may not be achieved.

In addition to the technical rehabilitation and improved modelling, greater attention must be paid to the social organisation of the irrigation at the local level. The main problem has been in the definition of community and state responsibilities. Whilst certain features of the control and operation must remain under a centralised authority, the ability of the state to oversee operations at the lowest (*mesqa*) level are limited and in the absence of local control negligence and corruption occur. Increasing attention needs to be given to the creation of local water user groups with autonomy in determining water allocations and co-ordinating maintenance. The aim should be to establish a system of supply capable of responding with efficiency to the variable demand. Combining greater local control over water with technical solutions, such as off-stream storage ponds and the installation of ground water pumps could allow improved flexibility and reductions in total inflow to be achieved.

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