

PN-ADB-593

52

Author: Royal Society for the Conservation of Nature: Mayyada Abu-Jaber
Descriptive Title: Integrating Water Demand Management Concepts in the National Curriculum
Program: Water Efficiency and Public Information for Action Project
Strategic Objective: SO2
Sponsoring USAID office: USAID/Jordan, Operating Unit WRE; Cooperative Agreement No.: 278-A-00-00-00201-00
Contractor Name: Academy for Educational Development
Date of Publication: 2002
Key Words: NGOs, Water Conservation, Jordan, Curriculum, Education
Delivery: Shera Bender sbender@aed.org



Water Efficiency for Participation and Action (WEPIA)

Integrating Water Demand Management Concepts
in the National Curriculum



Identifying Gaps and Repetitions of Water Concepts in the National Curriculum

18th -19th of January 2002

Royal Society for the Conservation of Nature
Mayyada Abu-Jaber

Table of Content

I. Introduction

II. Objectives

III. Workshop Sessions

1- Introductory Session

2- Session 2 Objectives and Goals

3- Session 3 Recommendations concept 1

4- Session 4 Recommendations concepts 5&6

5- Session 5 Recommendations concept 3

6- Session 6 Recommendations concepts 4& 7

7- Closing Session

IV. List of Participants

V. Appendix

I. Introduction

This workshop will be the last stage in the curriculum development needs assessment stage.

Thus far, the project team has developed the goals and objectives for the new infused curriculum, a complete mapping of the existing curriculum and identified the national framework through the cooperation with the Ministry of Education. A task force of almost 40 participants has been trained on the curriculum development process this includes four members from the Royal Society for the Conservation of Nature team.

Throughout the process of curriculum development 14 participants from the curriculum development division at the Ministry of Education has been trained as well. The training included both the understanding of the process of infusion as well as the full knowledge of the water demand management concepts.

The next big step in the curriculum need assessment process is to develop the scope and sequence chart using the information and recommendations of an "informed" audience. Thus, in this workshop a study of the water concepts that are adequately covered in the textbook, those that need reinforcement and the concepts that need to be introduced into the curriculum will be identified. Following this stage, suggestions will be made to infuse the material (demand and supply management) in the appropriate areas of the curriculum ensuring natural links rather than artificial development.

This workshop also hosted the largest numbers of participants from the curriculum development division- the informed audience-. While the teachers are only specialized in a certain grade level, the curriculum division subject representatives have the full picture, knowledgeable in a range of grades (1-11). Thus, identifying the gaps in the sequence table.

The curriculum division in the ministry of education is now fully supportive of the program, yet they have little ownership to the materials produced so far. Thus, it was vital to conduct the

workshop in a setting where both the technical committee, members of the RSCN staff and the curriculum division had more time to share experiences. Thus, the workshop was conducted in Aqaba.

Upon the recommendation of the higher committee a final document should be prepared before the beginning of February to identify the material to be added or amended in the textbook. The material will be prepared in this workshop.

The main participants in this workshop in addition to the representatives from the curriculum division are private and public school teachers, and the technical committee.

II. Objectives

Objective of the workshop:

Need assessment of water concepts in the national curriculum.

General objective

Preparing the curriculum guide.

Specific Objective

Identifying the gaps and repetitions in the current curriculum.
Suggesting the concepts that will be added or reinforced in the curricula.

Operational Objective

- Group work to fill a matrix of gaps and repetitions
- Group work suggesting the concepts that will be added into the curriculum.

III. Workshop Sessions

Day 1: Friday 18-1-2002

Session 1:

Introductory Session:

Ms. Mayyada Abu-Jaber thanked the participants for their dedication and commitment to the project and introduced Dr. Mahmood El Massad, head of curriculum division at the ministry of education.

Dr. Massad reiterated that this project is a priority to the curriculum division and that a full cooperation with the Royal Society for the Conservation of Nature has been set. He also included the importance of integrating demand management concepts into the current curriculum. He explained that the instructional methodologies should be interactive to allow the student to think critically when tackling water issues and to participate in his local community to alleviate water problems. Furthermore, he explained the importance of raising the values and beliefs of the students to become a positive environmental behavior. Finally, he thanked the management of the project and the participants for their hard work.

Session Two:

Objectives & Goals:

Mayyada Abu-Jaber

This session was an introductory session for the new participants from the curriculum division. In this session the vision, objectives and goals of the project were explained. The structure of the project was explained by introducing the technical committee and the task force. Achievement to date and the approach to the work were explained (appendix)

At the end of the session the goals and objective of water education was introduced in an interactive manner. The activity was set to ensure that all participants are aware of the main goals that will be achieved at the end of the project

The activity:

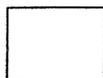
- 1- Divide the audience into 4 groups of mixed specialty.
- 2- Each group is to choose a sub concepts from the demand management concepts (for example: water pricing techniques)
- 3- Keeping the goals of water education in mind, the group will have to design activities in a sequential manner.
- 4- The activities will develop throughout the schooling year with the cognitive development of the child.
- 5- Each goal of water education is specified into a grade level.
- 6- Keeping figure 1 in mind, the activity then should be assigned a goal (awareness, knowledge, values, skills and participation).
- 7- To further elaborate on the water goals a document is set to explain each goal.

Output:

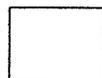
- 1- Each group identified concepts and placed them sequentially into grades relating them to the goals of water education.
- 2- It was apparent from the group presentation that there was confusion between the skills acquired and Citizen action - participating on a local scale-. - This was explained briefly to the participants.

	1-3	4-6	7-9	10-11
Awareness				
Knowledge				
Values				
Skills				
Participation				

By: Wisconsin Curriculum Model for Environmental Education



Major Emphasis



Minor Emphasis

Session 3:

Concept 1: properties of water.

Dr. Qasim El Shunnaq:

Distributed the first concept and the gaps and repetition matrix (appendix 5). Each group had to use the scope and sequence chart to identify the gaps and repetition.

Following this step, a table is filled to identify the concept, the grade level and the subject mater in which a concept needs to be tackled.

Activity:

- Divide the participants into four groups
- Each group is given a grade level
 - Group 1: grades 1-3
 - Group 2: grades 4-6
 - Group 3: grades 7-9
 - Group 4: grades 10-11
- Analyze the concepts in the scope and sequence chart

For the concepts that need reinforcement an O is placed in the box.

For concepts that need renewing an X is placed in the box

For any existing concept the box is remains empty.

- Fill the gaps and repetition charts.
- Rotate the sequence charts four times in order for all groups to fill the gaps and repetition charts for all grades.
- Each group writes the suggestions for each sub-concept in a table shown below>

Concept	Grade level	Subject	Comments
1-			

Output:

Four suggestions for infusing the concepts that are not covered in the textbook into the current grade 1-11 textbooks focusing on the five chosen subject (Social studies, Science, Mathematics, Vocational Studies & ICT)(appendix 1).

Session 4:

Concepts 5: Demand Management

Concepts 6: Supply Dynamics

Dr. Imfudi Abu Hola & Dr. Mousa Abu Sill

Concepts five and six are the most important, containing the demand and supply management issues and are apparently missing from the textbook.

The participants were divided into smaller groups of two. For each concept, two groups gave their recommendations.

Outputs:

Two recommendations for infusing the missing sub-concepts in both concept five and six into the current grades 1-11 textbook in the appropriate chosen subjects (appendix 2)

Day 2:
Saturday 19-1-2002

Session 5:
Concept 3: Water Resources in Jordan.

Mr. Qusay Aarif

Activity:

This concept is crucial as it contains many national water statistics and figures. These figures have not been changed since late eighties.

The participants were divided into two groups; one group analyzed first half of the concepts and gave suggestions and the next group analyzed the next half of the concepts and gave their suggestions.

Output:

The main outputs for this session were to identify all concepts that needed updating; a recommendation was made to infuse natural water reserves in Jordan and their conservation into the curricula. Two suggestions were made for this concept in order to infuse the sub-concepts in the current textbook in the chosen subjects (appendix 3).

Session 6:
Concept 4: Water Pollution
Concept 7: Water and Society.

Mr. Mohammad Qada'an.

Concept 7 although a very important concepts which explains the importance of water to societies, can mainly be tackled in literature subjects and others such drama, art and music which are not the target for this project.

Concept 4 is covered well in the textbooks.

Output:

Two sets of suggestions for infusing these concepts in the current textbook were made. (Appendix 4)

Session 7:

Closing session

Mayyada Abu-Jaber

The results of the workshop was presented, this was followed by an explanation of the next step in the curriculum development process. It was explained that in smaller groups containing mainly the curriculum development division and the technical committee along with the RSCN awareness staff a final suggestion list would be prepared. Discussions will be held using the suggestions made at this workshop, in which a final list of concepts added into the textbook will be prepared as well as the subject and grade level in which it will be covered.

Dr. Mahmood Massad

The head of the curriculum division Dr. Mahmood Massad thanked all participants for their enthusiasm and dedication to the project. He explained the importance of using ICT while infusing the material into the textbook. He also reiterated the importance of having as many of the curriculum division as possible in the integration process.

IV. List of Participants

1. Mayyada Abu-Jaber WEPIA Project Coordinator -Environment
2. Dr. mahmood Massad Curriculum Division/MOE- Head of CD
3. Dr. Mohammad Qadah Curriculum Division/MOE- Former SH
4. Qusay Aararif Curriculum Division/MOE- Vocational
5. Dr. Mousa Abu-Sill Curriculum Division/MOE- Humanities
6. Mohammad Qadan Curriculum Division/MOE- Geology
7. Lina Ibrahim Curriculum Division/MOE- Biology
8. Khalid Arabeiat Curriculum Division/MOE- Mathematics
9. Nisreen El Orani Curriculum Division/MOE- Administration
10. Ayisha Daglas Curriculum Division/MOE - Vocational
11. Saleh El Omari Curriculum Division/MOE - Geography
12. Abdullah Ahmad Curriculum Division/MOE - Geography
13. Khalid Hamam Curriculum Division/MOE - I CT
14. Dr. Khalil Hajaj Curriculum Division/MOE - History
15. Khalid Darabashi Public School/ Um Salama - Science
16. Mohammad Zahran Public School - Science
17. Ahmad Namrouti Public School/Rukabi - Science
18. Osama Abid Public School/Zeid Bin Harith- Science
19. Basam Qawasmeh Private School/Namuthajiyah - ICT
20. Jumana Hijazin Private School/Namuthajiyah - Science
21. Shawqi Ramsis Private School/Schneller - Chemistry
22. Dr. Qasim El Shunnaq University of Jordan
23. Dr. Imufadi Abu-Hola Universtiy of Jordan
24. Fatima Mughrabi Royal Society for the Conservation of Nature
25. Razan El Hadidi Royal Society for the Conservation of Nature
26. Hadeel Samara Royal Society for the Conservation of Nature
27. Raed Abu-Hayaneh Royal Society for the Conservation of Nature
28. Jenars Arsalan Royal Society for the Conservation of Nature
29. Nidal El Majali Activity Officer/MOE/Aqaba

Appendix



الرؤية للمشروع

- الطلبة على وعي تام بوجود مشكلة مياه في الاردن .
- المشروع يستهدف المليون ونصف مواطن اردني .
- التركيز على الطرق الامثل لاستخدام المياه (ادارة الطلب على المياه)
- منح الطلبة فرصة العمل مع مشاكل حقيقية – وليست نظرية
- زرع القيم البيئية الايجابية لدى الطلبة لتشكل سلوكهم ككبار
- يلعب المنهاج المدرسي والهيئات التدريسية دورا رئيسيا في عملية تشكيل عقول هؤلاء الطلبة كونهم مثلا يحتذى به .



الهدف من المشروع

دمج المفاهيم المائية وخاصة ادارة الطلب على المياه في المناهج الحالية

ان تكون مناهج التفاعل هي الوسيلة التعليمية خلال الدمج .

عملية الدمج/ أو التفعيل تبدأ في المراحل الاساسية المتأخرة (السابع ،
الثامن ، التاسع)

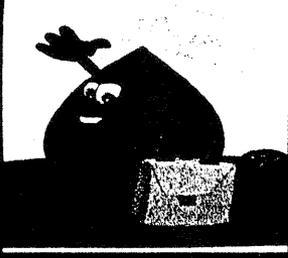
المواضيع المختاره هي العلوم ، الاجتماعيات ، التربية المهنية ، الحاسوب
والرياضيات .

تعليم الطلبة على التفكير المبدع والنقدي والخلق في حل المشكلات
المتعلقة بقضايا الطلب على المياه



مخرجات المشروع

- التعرف على جميع الاحصائات المائية القديمة وتحديثها
- كتابة الخطوط العريضة للمفاهيم المائية .
- كتابة أنشطة مساندة للوحدات في الكتب المدرسية ، وهذه الانشطة تكون "تفاعلية" تركز على المهارات المختلفه للطالب والتي يحتاجها من أجل التنفيذ للبيئة .
- كتابة الاهداف العامة من النشاط، خطوات التدريس وارشادات التقويم في كتاب دليل المعلم .
- تزويد الطالب و المعلم بمراجع (كتب ، Internet ،مجلات ...)
- أعداد ٢٠ مدرب
- تأهيل ٥٠٠-١٠٠٠ معلم ومعلمة



اللجنة الفنية

مختصي تطوير المناهج من الجامعة الاردنية
- الدكتور قسيم الشناق والدكتور ماضي أبو هولا.

مديرية المناهج و الكتب المدرسية:

- الدكتور موسى أبو سل
- السيد قصي عارف
- السيد محمد قعدان

قسم تطوير المناهج في مدرسة البكاوريا

- السيده سهى أبو دية.

مختصي مياه:

- الدكتور ه مني هندية من جامعة العلوم و التكنولوجيا
- المهندس رانيا عبدالخالق-من وزارة المياه و الري

مختصين البيئة و التوعية المائيه

.. فريق الجمعية الملكية لحماية الطبيعة.

مشروع الكفاءه المائيه و التوعية

معتصم حدادين و لى صيداوي



الفريق الوطني

مديرية المناهج والكتب المدرسية

مدارس حكومية

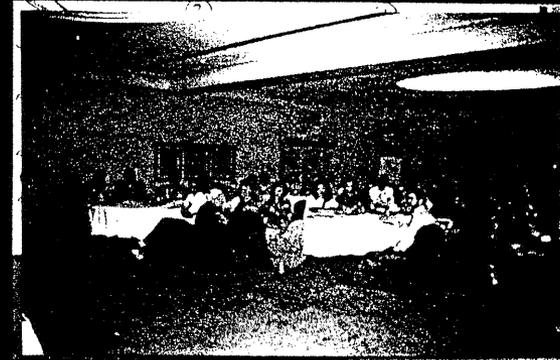
وزارة المياه والري



مدارس خاصة

طلاب

منهجيتنا:



التعلم من خبرات مختلفة

تشاركي



تفاعلي



الاستدامة



ميداني



انجاز اتنا

- تحديد أهداف وغايات التربية المائية.
- مسح الكتب المدرسية من الصف الاول الى الحادي عشر لايجاد المفاهيم المائية المغطاه حاليا في الكتب المدرسيه، والتأكد من :
 - هل المعلومات تحتاج لتحديث؟؟
 - هل تحتاج لتعزيز؟؟
 - هل المعلومات مكتظة؟؟
- تحليل المفاهيم المائية المرجعية المعروفة عالميا والتي نريد دمجها في الكتب المدرسيه الحاليه، والتأكيد على هذه المفاهيم واستيعابها .
- مقارنة ما بين المفاهيم المائية المرجعية مع تلك الموجودة بالكتب .
- التعرف على التدرج العمودي والافقي للمفاهيم المائية باستخدام مصفوفة موحدة



أهداف التربية المائية

✦ الوعي الادراكي

✦ المعرفة

✦ الاتجاهات والقيم

✦ مهارات المواطنة الصالحة

✦ مهارات التنفيذ والممارسة

الهدف	الصف	١-٢-٣	٤-٥-٦	٧-٨-٩	١٠-١١
الوعي					
المعرفة					
القيم					
المهارات					
التفويض					

توزيع الاهداف على مستويات الصفوف

القيم والمهارات البيئية

- ١ - مستويات القيم والسلوك
- ٢ - مستويات المهارات البيئية
- ٣ - التنفيذ والمسؤولية
- ٤ - تحضير عدة أنشطة عن مفهوم ادارة الطلأ على المياه
- ٥ - الأنشطة تتدرج على صفوف مختلفة يتم تحديدها
- ٦ - بدأ من أقل المهارات البيئية وتلبي قيمة معينة حتى أعلى المهارات والقيم (يجب تحديد المهارة والقيمة والتنفيذ الذي اخترته).
- ٧ - مهارة التنفيذ والمساهمة تبدأ بالصفوف ٨-٩-١٠-١١.

التغيرات المتوقعة

أهمية الماء لجسم الإنسان	الثاني ، الرابع	تربية ، اجتماعية	الوحدة: البيئة في الأردن والمشاكل البيئية
	تاسع	جغرافيا	استخدام الماء
	ثامن	علوم	تعزيز
الخصائص بيولوجية لماء الشرب		أجسام	

الرمز :

SC العلوم

Go الجيولوجيا

Ch الكيمياء

B البيولوجيا

Ph الفيزياء

It الحاسوب

Ve التربية المهنية

M الرياضيات

Ss الاجتماعيات

H التاريخ

G الجغرافيا

C التربية الوطنية

K = knowledge المعرفة

S = skill المهارة

V= value القيمة

Ac= activity المشاركة

Appendix 1

Group One
Concept One
(Water Properties)

Concept	Comments	Subject	Grade
Unusual Properties of Water	Matter and its / <i>Reinforce</i> properties	<i>Chemistry/Science</i>	Nine/Seven
The Importance of Water to the Human System	Environment in / <i>Reinforc</i> Jordan	<i>Social Studies</i>	Four& Two
Physical Properties of Drinking Water	Add	<i>Vocational / Science</i> <i>Studies</i>	Three
Microbiological Properties of Drinking Water	Add	<i>Biology</i>	Nine

Group Three
Concept One
(Properties of Water)

Concept	Comments	Subject	Grade
Diseases due to Water Shortage	Unit Two	<i>Social Studies</i>	Nine
Water Molecule		<i>Chemistry</i>	Nine & Ten
The importance of Water to the Human System	Water Uses	<i>Social Studies</i>	Nine
Water Borne Diseases		<i>Biology</i> <i>Vocational Studies</i>	Six Seven
Properties of Drinking Water	Re-evaluate Survey		

Group Two
Concept One
(Water Properties)

Concept	Comments	Subject	Grade
Concept	Comments	Subject	Grade
Osmosis	<i>Reinforce</i>	<i>Biology</i>	Nine
Unusual Properties of Water	<i>Reinforce</i>	Physics	Nine
Importance of water to the human system	<i>Reinforce</i>	Science	Eight
Physical properties of drinking water	<i>Add</i>	<i>Chemistry</i>	Nine
Chemical properties of drinking water~	<i>Add</i>	<i>Chemistry</i>	Nine
~ Microbiological properties	<i>Add</i>	<i>Biology</i>	Nine

Group Four
Concept One
(Properties of Water)

Concept	Comments	Subject	Grade
Osmosis	<i>Reinforce</i>	<i>Biology</i>	Eight
Diseases due to water shortage	Add	<i>Biology</i>	Eight
Diseases due to water pollution		Biology	Nine& Eight
Water borne diseases		Science	Six
Drinking Water Specification	Add- non existent in the curriculum	Science	Six
Physical Properties of Water		Science	Six
.Chemical Properties of Drinking Water		<i>Biology</i>	Nine
Microbiological properties of Drinking Water			

Appendix 2

Awareness	Add/ Water & life	<i>mistryChe</i>	Nine
Water Leakage	Add	<i>Chemistry</i>	Nine
GIS & Remote Sensing	Add	<i>ICT</i>	Seven
Prediction & Forecasting	Add	<i>ICT</i>	Ten

Group Four
Concept Six
Dynamics of Supply

Concept	Comments	Subject	Grade
New Technologies- Waste Water Waste Water Reuse	<i>Add</i>	<i>/ Vocational Studies</i>	Ten
Drinking Water-Treatment ¹	Water Resources in Jordan	<i>Agriculture</i> <i>Civics</i>	Seven
Practical Studies Design of Network		<i>ICT</i>	<i>Eleven</i>
Problems and Obstacles – City Planning *	Demographic Problems- Pressure on Water	<i>Social Studies</i> "	Ten enSev
Town Planning Water Leakage Water Quality	Water in our life (Science & Society)	<i>Chemistry</i> "	Nine Nine
GIS & Remote Sensing	<i>ICT in our life</i>	<i>ICT</i>	Seven
Prediction and Forecasting Technique		<i>ICT</i>	Ten

Group three
Concept Six
Dynamic of Supply

Concept	Comments	Subject	Grade
Water Desalination Plants	<i>Add</i>	<i>Mathematics</i>	Six
Waste Water Treatment		Earth Science & <i>Chemistry</i>	Nine
Transfer of Water From Neighboring Countries	Measure Costs	<i>Mathematics</i>	Four
Water Leakage	<i>Add</i>	<i>Mathematics</i>	Three
Water Budget	Adding figure to the hydrological Cycle	Earth Science / <i>Mathematics</i>	Eleven + Six
Water Treatment Plants	Develop	<i>Social Studies</i>	Nine & Eleven
Transfer of Water From Neighboring Countries	Develop	<i>Social Studies</i>	Nine
New Resources	Develop	<i>Social Studies</i>	xSi+Seven
Scientific Studies	Develop	<i>History</i>	Eleven
Economic Feasibility (cost & benefit)	Develop	<i>Social Studies</i>	Ten
Maintenance of Water Network	Develop	<i>Social Studies</i>	Ten

Group Four
Concept Six
Dynamics of Supply

Concept	Comments	Subject	Grade
Waste water Reuse	Add	<i>Agriculture / Vocational Studies</i>	Ten
Drinking Water Treatment	Add/ Water Resources in Jordan	<i>Civics</i>	Seven
Water Network Design	Add	<i>ICT</i>	<i>Eleven</i>
Problems & Obstacles	Add/ Demography in Jordan	<i>Social Studies</i>	Ten

	<i>Add</i>	<i>Mathematics</i>	Six +Five
Observation and Monitoring	<i>Add</i>	<i>Vocational Studies</i>	Six
Measurement of domestic consumption	<i>Add</i>	<i>ICT & Mathematics</i>	Nine
Reading of Water Meter	<i>Add</i>	<i>Mathematics</i>	Seven•Six•Five

		"	Five
Desertification		<i>Biology</i> <i>Social Studies</i>	Ten Ten
Infertility		Science <i>Social + Social Studies</i> <i>Studies</i>	Two Ten

Group Two
Concept Five
Demand Management

Concept	Comments	Subject	Grade
Personal Use of Water	Develop + Add	<i>Vocational Studies</i> Science	Three + Two + One
Tourism	Add	<i>Civics</i>	Six + Two
Water Pricing Technique	Add	<i>ICT & Mathematics</i>	Ten or Nine
Codes and Specification of Water outlets	Add	Chemistry	Nine
Incentives for Water Conservation	Add	<i>Social Studies</i>	Four + One
Taxes for misuse	Add	<i>Social Studies</i>	Four + One
Rules and Regulations for water Conservation	Add	<i>Civics</i>	Ten
Water Shortage	Add	<i>Civics</i>	Eight
Desertification	Reinforce	<i>Social Studies / Social Studies</i>	Ten / Eight
Infertility	Reinforce	<i>Social Studies / Social Studies</i>	Ten / Two
Water Conservation Techniques		<i>Social Studies</i> <i>Vocational</i>	One Four & Six Seven & Nine
Desert Farming	Add	<i>ICT</i>	Nine
Evaporation Reduction Techniques	Develop	Science	Seven
Water Saving Device	Add	<i>Vocational</i>	even S

Group One
Concept Five

Concept	Comments	Subject	Grade
Water Harvesting		Science "	Five Six
Grey Water System		<i>Vocational Studies</i> " "	Seven Eight Nine
Water Saving Devices		<i>Vocational Studies</i> " " <i>Mathematics</i>	Seven Eight Nine Six
Desert Farming		<i>Social Studies</i>	Ten
Efficiency in the Use of Water		<i>Vocational Studies</i> <i>Social Studies</i> " (Percentages) <i>Mathematics</i>	Seven Eight Nine Six
Domestic Consumption		<i>Mathematics</i>	Three
Taxes on misuse		<i>Social Studies + Civics</i> <i>Mathematics</i>	Ten Six
Rules and Regulations		<i>Civics</i> "	Ten Seven
Floods		<i>Social Studies</i>	Eleven Seven Nine
Aridity		<i>Social Studies</i>	Nine
Water Shortage		<i>Social Studies</i>	Three

Appendix 3

Group Four
Concept Three
(Water Resources in Jordan)

Concept	Comments	Subject	Grade
Rivers and Wadis	<i>Develop</i>	<i>/ Civics Social Studies</i>	Nine /Seven Nine /
Precipitation	<i>Develop</i>	<i>Social Studies</i>	Nine
Oceans	Add	<i>Social Studies + Civics</i>	Nine /Seven
Springs	(Nine) Add (Seven) <i>Develop</i>	<i>Social Studies + Civics</i>	Nine /Seven
Ground Water	<i>Updating + Develop</i>	<i>Studies Social</i>	Nine
What are the water resources in Jordan	<i>Develop</i> Add	<i>History Civics</i>	Seven + <i>Eleven</i>
Distribution of water resources	Add	<i>Social Studies</i>	Seven
Water Budgeting	Add	<i>Social Studies ICT</i>	Nine Ten
Hydrogeology of Jordan	Add	Earth Science	Eleven
Ground Water Aquifer	<i>Updating</i> " " "	Earth Science <i>Civics</i> <i>History</i> <i>Social Studies</i>	<i>Eleven</i> Seven <i>Eleven</i> Ten
Ground Water Basins	<i>Updating Develop & Updating</i>	<i>Civics</i> Earth Science	Seven <i>Eleven</i>
Water Budgeting	<i>Develop</i> Add	<i>Chemistry Social Studies</i>	Nine Nine
Deficit	<i>Develop</i> Add	<i>Social Studies Civics</i>	Nine Seven
Surface Water Basins	<i>Updating</i>	<i>Social Studies</i>	Ten

	Add	Earth Science	Nine
Surface Water Quantities	<i>Develop & Updating</i>	<i>Social Studies</i>	Ten
Surface Water Quality	Add	<i>Chemistry</i>	Nine
Spring Water	<i>Develop</i>	<i>Chemistry</i>	Nine
Surface Water Harvesting	<i>Develop</i>	<i>Civics</i>	Seven
	<i>Updating</i>	<i>History</i>	<i>Eleven</i>
		<i>Social Studies</i>	Nine
		"	Ten
		<i>Biology</i>	Ten
Artificial Recharge of ground water	<i>Develop</i> Add	<i>Social Studies</i>	Nine
Water Transfer		Not found in any subject or grades	
Reuse of waste Water			
Uses of Brackish Water			
Desalination of Brackish Water			
Desalination of sea water	Add	<i>Chemistry</i>	Nine
Oasis Formation	Add		
Marine Life	Add	<i>Civics</i>	Seven
Protection of Marine Life	Add	<i>Biology</i>	Ten
Uses of the Gulf of Aqaba		<i>Civics</i>	Eight
Dead Sea Ecosystem	<i>Develop</i>	Science	Eight
		<i>Chemistry</i>	Nine
The area of the dead sea	Add	<i>Social Studies</i>	Ten
Protection of the Dead Sea	Add	<i>Social Studies</i>	Nine
Socio-economic Projects	Add	<i>Civics</i>	Seven
Governments	Add	<i>History</i>	<i>Eleven</i>
NGO	Add	Needs to be added	
Private Sector			

Center for Research			
Universities			
Consultants & Specialists			
Water related Jobs			
Water Projects	Add	<i>Civics</i> <i>Social Studies</i>	Seven Six

Group Two
Concept Three
Water Resources in Jordan

Concept	Comments	Subject	Grade
Oceans	Develop	<i>Social Studies / Social Studies</i>	Six+Three
Springs	Add	<i>Social Studies / Social Studies</i>	Six+Three
Ground Water	Add/Develop	<i>Social Studies/Science</i>	Six+Four
Shared Water Resources	Add	<i>Social Studies</i>	Eleven+ Ten
Ground Water Basins	Develop	<i>Social Studies</i>	Four
Ground Water Budget Deficit	Add	<i>Social Studies</i>	Eleven+ Ten
Surface Water			
Surface Water Basins	Reinforce	<i>Social Studies</i>	Seven+Four+Three
Quantity of water	Develop	<i>Social Studies</i>	Four
Therapeutic Waters	Develop	Science	Five+Four+Two
	Develop	<i>Social Studies</i>	Six
Water Harvesting	Develop	Science	Six
Artificial Recharge of Ground Water	Develop	<i>Social Studies</i>	Four
King Abdullah Canal	Add	<i>Social Studies</i>	Seven

Water Transfer	<i>Add</i>	<i>Social Studies</i>	<i>Eleven•Ten</i>
Waste Water Treatment Plant Brackish Water Reuse of Brackish Water in Agriculture Sea Water Desalination	<i>Add</i>	Chemistry	Nine
Natural Reserves in Jordan	<i>Reinforce & Updating</i>	<i>Social Studies</i> <i>Social Studies</i>	Nine•Five
Dead Sea	<i>Develop & Updating</i>	<i>Social Studies</i> <i>Social Studies</i>	<i>Eleven&•Ten</i>
Gulf of Aqaba	<i>Develop & Updating</i>	<i>Social Studies</i> <i>Social Studies</i>	Six•Four
Stakeholders	<i>Add</i>	<i>ICT</i>	<i>Eleven•Ten•Nine</i>

Group One
Concept Three
Water Resources in Jordan

Concept	Comments	Subject	Grade
Precipitation	Concept <i>Reinforce</i> Upgrading in Science	<i>Social Studies</i>	Six
Springs		<i>Vocational Studies</i> <i>Social Studies</i>	Ten
Ground Water	<i>Reinforce</i>	Science	Four
Shared Water Resources	Water rights for the Arab world	<i>Social Studies</i> <i>History</i>	Ten <i>Eleven</i>
Ground Water Resources in Jordan	Distribution of ground water aquifers (statistics on safe yield)	<i>Mathematics</i> <i>Mathematics</i> <i>Social Studies</i> Earth Science	Two Nine Ten Nine

Surface Water Resources in Jordan	<i>Updating / Reinforce</i>	<i>Social Studies</i>	Ten
Surface Water Harvesting	Role in supplying water and Figures.	Earth Science & <i>Chemistry</i>	Nine
Artificial Water Recharge	Mechanism of ground water recharge (pictures)	Earth Science + <i>Social Studies</i>	Ten
Non Conventional Water Resource in Jordan	The importance of non conventional Resources to supply water (domestic and agriculture)	Earth Science+ <i>Social Studies</i>	Ten
Non Conventional Water Resource in Jordan	Conservation of Water in the reserves	<i>Social Studies</i> <i>1 Studies</i> <i>Social Studies</i>	Four Nine Ten
Area of the Dead Sea	<i>Develop</i> (Dead Sea Map)	Science (All grades) <i>Social Studies</i>	Five
Stakeholders	Their Roles	<i>Civics</i>	Seven

Group Three
Concept Three
(Water Resources in Jordan)

Concept	Comments	Subject	Grade
Rivers	Guide development <i>Guide Updating</i> "	<i>g Civics</i> <i>g Social Studies</i> <i>g Social Studies</i>	Seven Nine Seven
Precipitation	Develop	<i>Social Studies</i>	Seven
Springs	<i>Develop</i>	<i>Civics</i>	Nine

Distribution of shared water resources in Jordan	<i>Develop</i>	<i>Social Studies</i>	Nine
Ground Water Aquifer	<i>Updating</i>	<i>Civics</i>	Seven
Ground Water Aquifer		<i>Social Studies</i>	Ten
Deficit		<i>Social Studies</i>	Nine

12

Appendix 4

Group One
Concept Four
Water Pollution and Treatment

Concept	Comments	Subject	Grade
Storage	Cleaning and monitoring tanks	Earth Science, History, Chemistry, Social Studies	Nine Ten
Water Pollution- Physical, Chemical and Biological	Health and Public Safety Figures and Statistics	Vocational Studies	Seven
Waste Water	Problems associated with the selection of treatment plants <i>Update/ Reinforce</i>	Social Studies/Social Studies Chemistry	Six•Five•Four Nine
Drinking Water Treatment	<i>Reinforce biological and chemical treatment</i>	Earth Science & Chemistry	Nine

Concept Four
Water Pollution and Treatment

Concept	Comments	Subject	Grade
Storage	<i>Add</i>	<i>Civics</i>	Six
Water Transfer	<i>Add</i>	<i>Civics</i>	Six
Accidents and Disasters	<i>Add</i>	<i>Civics</i>	Six
Comparing world and local water specifications	<i>Develop</i>	<i>Chemistry</i>	Nine
Polluted Water Chemical, Physical and Biological	<i>Develop</i>	<i>Chemistry</i>	Nine
Pollutants <i>Agriculture</i> <i>Industrial</i>	<i>Add</i>	<i>Chemistry</i>	Nine

Domestic			
Indicators of Pollution	<i>Develop</i>	<i>Chemistry</i>	Nine
Biological and Chemical Tests	<i>Add</i>	<i>Biology</i>	Nine
Causes of Pollution			
Domestic Use			
Agricultural Use	<i>Develop</i>	<i>Biology</i>	Ten
Industrial Use	<i>Develop</i>	<i>Social Studies</i>	Nine
	<i>Add</i>	<i>udiesSocial St</i>	Nine
Solid Waste Landfill	<i>Add</i>	<i>Chemistry</i>	Nine
Agriculture Runoff	<i>Develop</i>	<i>Biology</i>	Ten
Ground water Pollution	<i>Add</i>	Earth Science	<i>Eleven</i>
Thermal Pollution	<i>Develop</i>	<i>Biology</i>	Ten
Marine Pollution	<i>Add</i>	Earth Science	<i>Eleven</i>
Prevention	<i>Develop</i>	Science	Six
/Treatment			
Biological, Chemical, Mechanical and	<i>Develop</i>	Earth Science	Ten
Physiochemical	<i>Develop</i>	Earth Science	<i>Eleven</i>
	<i>Develop</i>	Earth Science	<i>Eleven</i>
	<i>Add</i>	Earth Science	<i>Eleven</i>

15

**Four Group
Concept Seven
(Water & Society)**

Concept	Comments	Subject	Grade
Contemporary Civilizations		<i>Social Studies</i>	Nine
Modern Civilizations	<i>Develop</i>	<i>History</i>	Ten
	<i>Develop</i>	<i>History</i>	Eleven
Internal Migration	Add	<i>History</i>	Nine
External Migration	Add	<i>Social Studies</i>	Eight
Carrying Capacity	Add	<i>cial StudiesSo</i>	Eleven
Depletion of Water Resources	<i>Develop</i>	<i>Social Studies</i>	Four
Water & Gender	Add	<i>Biology</i>	Nine
Local Experience	Add	<i>Social Studies</i>	Nine
Values & Beliefs	<i>Develop</i>	<i>History</i>	Seven
			Nine
Values	Add	<i>Civics</i>	Seven
Willing to change	Add	<i>Civics</i>	Seven
Re-assessing ones own values	Add	<i>Vocational Studies</i>	Seven
Changing Values	Add	<i>Civics</i>	Seven