Pest Management Grants—Demonstration Final Report

Kids in Gardens

Contract Number:
99-0215

Principal Investigator:
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Aquatic Outreach Institute

June 30, 2001

Prepared for the California Department of Pesticide Regulation

DISCLAIMER

The statements and conclusions in this report are those of the contractor and not necessarily those of the California Department of Pesticide Regulation. The mentioned commercial products, their source, or their use in connection with material reported herein is not to be construed as actual or implied endorsement of such products.

ACKNOWLEDGMENTS

The Aquatic Outreach Institute is grateful to a number of organizations for their ongoing support of its programs, including:

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1001 I Street, Sacramento, CA 95814-2828, (916) 324-4272
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255 Glacier Drive, Martinez, CA 94553, (925) 313-2373
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5019 Imhoff Place, Martinez, CA 94553, (510) 229-7310
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375 11th Street, PO Box 24055, Oakland, CA 94623, (510) 986-7610
Michele Young, City of San Jose Environmental Services Department

777 N. 1st Street, Suite 300, San Jose, CA 95112, (408) 277-5533

This report was submitted in fulfillment of 00-00197S/99-0215I, "Kids in Gardens," by Aquatic Outreach Institute and the partial sponsorship of the California Department of Pesticide Regulation. Work was completed as of June 30, 2001.

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EXECUTIVE SUMMARY

The Kids in Gardens program harnesses the current strong interest from teachers and school administrators in developing school gardens, and assists schools in planning and developing their gardens. As plans for the gardens progress, however, so should an overall philosophy for insect and weed management. The *Kids in Gardens* program assists teachers in actively promoting IPM as the preferred method of garden management, and helps these educators in actively involving their students in assessing the health of their gardens, and determining how their gardens (both at school and at home) can be managed with environmentally sound methods. As a result of this project, 102 kindergarten through 12th grade educators attended the *Kids in Gardens* workshop, and, by involving their students in IPM-related gardening activities, they passed information about IPM along to more than 6,000 students in this year alone. Through outreach projects, students educated more than 6,500 family and community members about Integrated Pest Management and least-toxic gardening techniques.

FINAL REPORT

INTRODUCTION

OBJECTIVES

The objectives of this project were:

1. To educate 90 kindergarten through 12th grade teachers on ways they can educate their students about reducing the use of pesticides in school and home gardens by sponsoring three *Kids in Gardens* workshops.

Tasks:

- Coordinate and promote 3 two-day *Kids in Gardens* workshops for teachers.
- Compile curriculum binders, resource materials, and handouts for workshops.
- Hold 3 *Kids in Gardens* workshops.

2. For those teachers to involve their approximately 4,500 students in Integrated Pest Management and school gardening projects.

Tasks:

- Teachers will conduct Integrated Pest Management and school gardening projects with their students, using curricula and resources obtained at the *Kids in Gardens* workshop.

3. For their students to educate their families and community members about Integrated Pest Management and least toxic gardening techniques. A minimum of 5,000 family and community members will receive information in the form of surveys, fliers, student artwork and essays about reduced chemical use in home and school gardens.

Tasks:

- Teachers will have students conduct pest management practices surveys with their parents and school grounds keepers.
- Teachers will conduct IPM-related outreach projects with their students.

All project objectives were met or exceeded. No problems were encountered meeting project objectives.

RESULTS

OBJECTIVE 1

To educate 90 kindergarten through 12th grade teachers on ways they can educate their students about reducing the use of pesticides in school and home gardens by sponsoring three *Kids in Gardens* workshops.

Tasks:

- Coordinate and promote 3 two-day *Kids in Gardens* workshops for teachers.
- Compile curriculum binders, resource materials, and handouts for workshops.
- Hold 3 *Kids in Gardens* workshops.

Workshops

Three *Kids in Gardens* workshops were conducted between July and October 2000. The workshops were held in Alameda County (July 22 and 29), Santa Clara County (August 4 and 11), and Solano/Napa County (October 21 and 28). Funds provided by DPR were used to expand the geographic range of the *Kids in Gardens* program. For the first time, the *Kids in Gardens* workshop was held in Santa Clara, Napa, and Solano Counties.

These workshops are exceedingly popular with teachers. All three workshops filled quickly, and two of them had lengthy waiting lists. A total of 102 educators, including formal classroom teachers and nonformal educators, attended the workshops and were trained in IPM gardening techniques. Flyers, agendas, participant lists, and sample evaluations and academic credit papers for the workshops are included in Appendices I–V.

IPM Curricula

IPM activities conducted in the workshops included pesticide label reading, safe use and disposal of pesticides, monitoring for pests, information on California native plants that attract beneficial insects, and role playing activities such as "Bugs on Stage," in which participants identify a particular garden pest or predator and make a presentation on its role in the garden ecosystem, as well as non-toxic ways to encourage or discourage it in the garden or home. All activities are designed for teachers to conduct with their students.

Teachers also received a 600-page binder with curricula and resources for conducting IPM gardening activities with students. Two new *Kids in Gardens* curriculum binders were developed for participants in Santa Clara and Solano/Napa Counties. These binders include regionally specific resource, funding, field trip, and contact information. (See Appendix VI for examples of curricula, including "Friend, Foe or Escargot?," "Pesticide Poll," and "Perilous Poisons.")

Surveys

Two surveys (see Appendix VII) were developed to measure home and school pest management practices. The surveys were designed for students to gather information about fertilization practices, weed and pest control, composting, and lawn care both at home with parents and on the school grounds with maintenance or grounds keeping personnel. Workshop participants were given the home survey to complete as homework during the workshop. Results of the surveys were discussed on the second day of the workshop, as well as ways of implementing the survey-gathering project with students. The surveys were translated into Spanish by staff at the California Department of Pesticide Regulation. See Appendix VIII for a summary of student outreach projects regarding the surveys.

Watching Our Watersheds Newsletter

One issue of the *Watching Our Watersheds* newsletter, published by Aquatic Outreach Institute as a way to provide continued resources and information to workshop participants, was completed as part of this grant. This newsletter provides IPM tips for school gardeners, as well as news of related projects that other workshop participants have conducted. See Appendix IX for the *Watching Our Watersheds* newsletter.

Measures of Success

Workshop Attendance

Alameda County	36 educators
Santa Clara County	29 educators
Solano/Napa Counties	37 educators
Total:	**102 educators**

Excerpts from workshop evaluations:

"This was one of the best workshops I have ever attended."
—Marilyn Charell, 3rd grade teacher, Silver Creek Elementary, San Jose

"Great workshop! Very friendly and personable presenters! I am very enthused and want to get going on my classroom garden!"
—Teresa Stuefloten, Kindergarten teacher, San Jose

"This is a great program. I loved how interactive all the learning is. It's all very useable and easy. I feel well resourced. I'm looking forward to looking through the binder."
—Liza Butler, K-3rd grade teacher, Fruitvale Elementary, Oakland

"This is such a great workshop, well-organized. Every single thing presented was useful, doable, helpful."
—Cheryl Nelson, Mary Farmar School, Benicia

Number of educators who received the Watching Our Watersheds newsletter: 1,588

OBJECTIVE 2
For teachers participating in the workshops to involve their approximately 4,500 students in Integrated Pest Management and school gardening projects.

Tasks:

- Teachers will conduct Integrated Pest Management and school gardening projects with their students, using curricula and resources obtained at the *Kids in Gardens* workshop.

Stipend Projects
To measure the extent to which teachers implemented this training in their classrooms and school gardens, a stipend was made available to all participants of the *Kids in Gardens* workshops. In order to receive the stipend, participants were required to do the following:

1. Conduct IPM and least-toxic gardening activities with their students.
2. Have students conduct pest management practices surveys with their parents at home and with school ground keepers or maintenance personnel.

3. Complete an outreach project with their students, based on the information that was gathered through the surveys (i.e., develop an IPM brochure to take home to parents, produce and distribute door hangers in the neighborhood, write articles on least-toxic pest management practices for the school newsletter).
4. Complete a survey about how they used the materials and information they received in the workshop.

It is impossible to know how many of the teachers who participated in the *Kids in Gardens* workshops went on to garden with their students and introduce them to concepts of IPM. However, several indicators point to a high return on the investment made in these 102 educators. First of all, the stipend projects that were completed (see Objective 3) indicate that teachers did actively, and creatively, use the information they received in the workshop. Secondly, this program is specifically designed to "train the trainer" so that information, resources, and activities imparted in a workshop can be used by teachers year after year. Given that the educators who participated in this program reach more than 6,000 students each year, the potential long-term benefits are significant.

Measures of Success

Number of students with whom Kids in Gardens participants work (2 workshops): 6,104

Excerpts from academic credit papers:

"One of the focuses of the garden will be to help students achieve a better understanding of their environment and the ways in which they can use integrated pest management techniques to benefit the garden. Throughout the year, the students will engage in projects such as surveying and learning about pesticide use. As they learn about the effects of pesticides on the environment, they will participate in activities such as "Pest Patrol," "Friend, Foe or Escargot?", and others which will encourage the desire to apply integrated pest management techniques in the garden."
—Zaby Bongiovanni, 4th grade teacher, Emanuele Elementary, Union City

"Through the Kids in Gardens workshop and Integrated Pest Management I have learned the proper way to tend to a garden, whether at home or school. Before the workshop, I would go to the local hardware store and purchase the chemical pesticide that would guarantee, according to the label, an end to my home pest problem. I never really thought about the bigger picture. Where did all the sprays, powders, and granules go? Out of sight, out of mind. I am more consciously aware of my actions now. Every purchase I make, every action, I think about where what I am buying will end up. Not just the container, but its contents too. Now, all I see is our "Pollution Soup" activity. I can't wait to do it with my kindergartners. It is a great visual!"
—Monic Inderbitzen, Kindergarten teacher, Kitayama Elementary, Union City

OBJECTIVE 3

For *Kids in Gardens* participants' students to educate their families and community members about IPM and least-toxic gardening techniques. A minimum of 5,000 family and community members will receive information in the form of surveys, fliers, student artwork and essays about reduced chemical use in home and school gardens.

Tasks:

- Teachers will have students conduct pest management practices surveys with their parents and school grounds keepers.
- Teachers will conduct IPM-related outreach projects with their students.

A total of 25 teachers completed stipend projects through this program. These projects included a wide range of outreach activities, including distributing doorhangers about less-toxic gardening practices in local neighborhoods, holding garden clean-up days, educating parents about beneficial insects through garden tours and brochures designed in class and sent home, and creating school-wide displays about healthy gardening practices.

More than 650 surveys were conducted between students and their parents, discussing pest and weed control, and fertilization practices at students' home gardens. Additionally, 12 school grounds keepers were surveyed about pest control practices at school. These surveys were collected by teachers and used as the basis of discussion about how to read pesticide labels, how to non-toxically control pests in the garden, and how to make informed decisions about purchasing garden products at the store.

Measures of Success

Number of teachers who completed stipend projects:	25
Number of students who conducted surveys with their parents:	656
Number of school grounds keepers who were surveyed:	12
Number of community and family members who received outreach information about IPM and less-toxic gardening practices:	6,613

Excerpts from stipend projects:

"People aren't using as many chemicals in their yards as I thought. We have a cabinet full of various chemical fertilizers, which after taking part in this program, I feel very reluctant to use.
—Danielle Petrell, Oster School, San Jose

"I learned about the need to get the message out about the effects of pesticide use and to build an awareness among our young future citizens in the hope that the problem can be diminished."
—Cherie Barnecut, Kitayama Elementary, Union City

"Through the surveys, students discovered that almost everyone used pesticide around their home somewhere. They were surprised to learn that pesticides are used at school. They learned about signal words and really looked carefully at labels."
—Karen Lance, Kitayama Elementary, Union City

Excerpts from academic credit paper:

"This workshop brought home the very real need to explain and demonstrate why I promote not using pesticides. The take-home survey will serve to open dialogue on this very real, and sometimes very invisible problem. I believe the survey will enable my classroom (and the parents of my students) to examine just exactly what we do in the garden and why. I look forward to seeing the finished surveys as they will give me an idea of what practices are the 'norm' for my students' families. My students will have the opportunity to act as ambassadors of a sort to the community. What they learn in the garden will be taken back home to family and friends."
—April Carlson, 1st-6th grade teacher, Hacienda Science Magnet, San Jose

"I will direct the students in their learning and eventually help them decide on an action project. I do not want to tell them what their project should be, but rather would like to inspire and guide them as they develop a project which they will embrace because it will have come from their desire to educate the community."
—Zaby Bongiovanni, 4th grade teacher, Emanuele Elementary, Union City

DISCUSSION

The *Kids in Gardens* workshops are an ideal tool for training teachers about Integrated Pest Management. By providing hands-on activities, lectures, and resource material, the workshops demonstrate simple, clear, and effective methods for controlling pests in an ecologically-sound manner based on least-toxic alternatives. Furthermore, all of the information presented in the workshops is designed to be practiced in the classroom with students, and to inspire teachers to engage their students in outreach projects that will educate residents in local communities.

The surveys developed through this project served as a useful tool to begin a dialogue between students and their parents about the types of chemicals they use in their homes, and what alternatives exist to these practices. Furthermore, they formed a basis for discussion at school, where further hands-on activities can illustrate the concepts of Integrated Pest Management in the classroom and in the garden. Information gleaned from these surveys was used to inform the outreach projects that students conducted, as they were inspired to become "stewards" of their environment.

This grant project highlighted several challenges to implementing outreach activities designed to change behavior regarding pest control. First of all, many students in the Bay Area live in apartments that do not have gardens or yards. Secondly, the surveys were only available in English and Spanish, and the Bay Area is home to many ethnicities who speak a multitude of languages. These populations could not so easily respond to the surveys. Also, many teachers indicated that school grounds keepers were reluctant to divulge information about what chemicals were being used to manage pests

at school. Finally, based on the fact that the number of teachers who completed and returned the stipend projects was relatively low, any material developed for teachers must be designed to accommodate their already busy schedules which more and more often are geared to meet academic standards and standardized tests.

Nevertheless, feedback from teachers who participated in this program indicates that *Kids in Gardens* provides relevant, useful, and sometimes surprising information that they can use in their own lives, as well as pass on to their students and the surrounding community.

SUMMARY AND CONCLUSIONS

The *Kids in Gardens* program has successfully trained more than 100 educators about Integrated Pest Management, and provided them with hands-on, practical tools to impart this information to students and community members. Based on evaluations (see Appendix IV), this program achieved its goals of not only training the trainers, but of ensuring a long-term payoff as teachers continue to use this material for years to come.

Furthermore, educating children regarding the role of all forms of life in the ecosystem, the impacts humans may have on the environment, and the choices that individuals make in dealing with "pest" problems, is a critical step in changing the behaviors and attitudes of this next generation of home gardeners who will have the skills to make informed decisions about the types of pest control they want to practice.

APPENDIX I

Workshop Flyers

Environmental Workshops for Teachers

Summer/Fall 2000 Workshops for Educators of Grades K-12

Enrollment Open to All Educators (formal and non-formal) Working in Santa Clara County

Kids in Gardens

A Pesticide Reduction Program

When: Fridays, August 4 & 11
Time: 9:00 A.M.–4:30 P.M.
Where: Hacienda Elementary School, San Jose
Cost: $25
Stipend: $150, for doing a follow-up project

Valerie Kells, from *The Natural History of Big Sur.*

Kids in Creeks

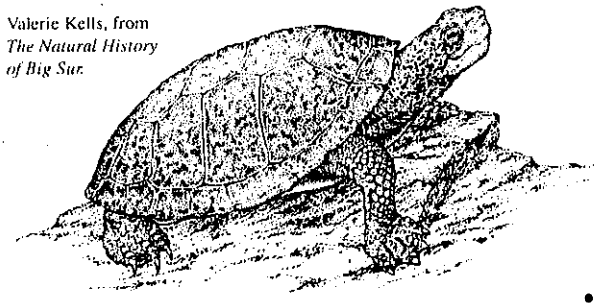
An Interdisciplinary Creek Exploration and Restoration Program

When: Saturdays, October 28 and November 4
Where: Coyote Hellyer County Park, San Jose
Second Weekend Location To Be Announced
Time: 9:00 A.M.–4:30 P.M.
Cost: $25

Participants In Each Workshop Receive:

- Classroom and Field Activities
- A Binder of Curriculum and Resources
- Free Use of Lending Library (videos and curriculum, reference books, salmon and frog suits, maps, and stream inventory kits)
- Easy access to grant funds for Action Projects
- Academic Credit from CSU Hayward—Sign up at the workshop!
  Kids in Creeks/Kids in Gardens: 1.5 units, $60, upon completion of a 2 page paper

The *Kids in Creeks* program is funded by the Santa Clara Valley Urban Runoff Pollution Prevention Program. The *Kids in Gardens* program is funded by the California Department of Pesticide Regulation and the City of San Jose. Both programs are implemented by the Aquatic Outreach Institute, as part of these organizations' overall efforts to enhance and protect the health of local watersheds, creeks, and the San Francisco Bay.



Valerie Kells, from *The Natural History of Big Sur*

Kids in Creeks

***Kids in Creeks* will provide teachers with information on how to:**

- engage students in hands-on science and inquiry-based learning
- teach about creeks and watersheds across the curriculum
- help students appreciate the natural world near their homes and schools
- increase awareness about the sources and impacts of water pollution
- provoke thought about the effects our lifestyles have on the environment

Participants will:

- learn how to sample for aquatic insects, monitor water quality, identify animal tracks, and stencil storm drains
- receive a resource binder full of creek activities, background information about wetlands and the Bay, local contacts and field trip sites, and funding sources
- receive access to AOI's Lending Library: videos, reference and activity books, and stream inventory kits

Comments from former *Kids in Creeks* participants:

"I can't speak highly enough of this class. I would recommend it to anyone. Thank you so much for one of the very best educators' classes I've taken in 24 years!" —*Karen Brown, Hillcrest Elementary, Rodeo*

"After completing the *Kids in Creeks* course, it has become crystal clear to us how to make the relationship between humans and our waterways real." —*Patricia Anderson and Linda Pruscha, Vintage Parkway School, Oakley*

Components of *Kids in Creeks* and *Kids in Gardens:*

Thematic Framework

The *Kids in Creeks/Kids in Gardens* framework can be used to teach about wetlands, gardens, and watersheds across the curriculum through History, Art, English, Geography, Math, and Science.

Action Projects

Participants will be provided with assistance in developing and conducting community action projects. Sample projects that classes might undertake include:

- developing a wildlife habitat garden to be certified by the National Wildlife Federation
- creating cultural or natural history booklets on local wetlands
- designing garden or creek murals for schools or local community centers
- holding a creek clean-up day and watershed celebration
- stenciling storm drains
- writing and illustrating field guides of native plants and animals
- raising Pacific chorus frogs in the classroom
- monitoring a local creek

Kids in Gardens

***Kids in Gardens* will provide teachers with information on how to:**

- engage your students with hands-on activities in the natural world
- design, implement, and manage a successful classroom or school garden
- build a strong framework for parental and community involvement
- demonstrate the connection between pesticides and urban runoff pollution
- develop theme gardens such as butterfly, hummingbird, schoolyard wildlife habitat, or organic vegetable gardens

Participants will:

- create worm bins that demonstrate natural cycles of decay and regeneration
- learn how to attract beneficial insects and birds
- propagate native plants

Please Note:

- Participants who attend both days of the Kids in Gardens workshop, complete a pollution prevention project with their students, and submit a report, will receive a **$150 stipend**!

Comments from former *Kids in Gardens* participants:

"The worm bin is great. I appreciate the instruction in propagation, seed preservation, and classroom activities. You have a done a fantastic job in organizing this information. Many thanks." —*Mary Holt, Novato Charter Scl*

"Time well spent. Informative, inspirational, well-paced." —*Elsie MacCracken, Mira Vista Elementary, Richm*

Yes! I am interested in attending the *Kids in Creeks* or the *Kids in Gardens* Workshop

Enclosed is my **non-refundable** check, payable to the Aquatic Outreach Institute.

❑ ***Kids in Creeks*, Oct. 28 and Nov. 4, 2000—$25** ❑ ***Kids in Gardens*, August 4 & 11, 2000—$25**

Please Note: *Both workshops are two days long.*

School:

Your Name: _____

School Name: _____

Address: _____

City: _____ Zip: _____ County: _____

School Phone: _____

Number of students you work with: _____

What type of garden are you interested in? _____

Home:

Address: _____

City: _____ Zip: _____ County: _____

Home Phone: _____

Fax: _____

Email: _____

Grades Taught: _____

Creek near school (if known): _____

Mail to: *Kids in Creeks* or *Kids in Gardens*
Aquatic Outreach Institute
1327 South 46th Street #155
Richmond, CA, 94804

For more information please call, email, or visit our website at *http://www.aoinstitute.org/*

Dede Sabbag, *Kids in Creeks*
(510) 231-5784
dede@aoinstitute.org

Sharyl McGrew, *Kids in Garden*
(510) 231-5783
sharyl@aoinstitute.org

Educators' Plans for Teaching about Creeks and Gardens:

"I took my inspiration from the workshop and decided to incorporate it in my classroom. My curriculum plans are to integrate science, literature, and art to teach the students about the world around them. My goal is for the students to learn how water, soil, and plants are all connected, and what we do at home and at school can affect that cycle. In May, for Open House, we will display a sample of all our projects, artwork, and our growing desktop gardens. Hopefully, the students will be eager and excited to bring their parents to school to learn."–*Linda Larsen, Jack London Elementary, Antioch*

"As a middle school Social Studies and English teacher, I have rarely brought science into my classroom. However, that is all about to change. After completing the *Kids in Creeks* workshop, I have discovered numerous ways to implement science into my 6th grade CORE curriculum."
—*Jennifer Barnwell, Riverview Middle School, Bay Point*

"I attended the *Kids in Gardens* workshop with my entire science department. Our department was so inspired that we went back to our site and approached our principle for a garden site. We managed to find the perfect spot, got our principle on our side, and wrote a grant to support phase I of the school's dream garden." –*Melissa Wrinkle, San Jose Middle School, Novato*

California Department of Pesticide Regulation

Santa Clara Valley Urban Runoff Pollution Prevention Program

Aquatic Outreach Institute
1327 South 46th Street #155
Richmond, CA, 94804

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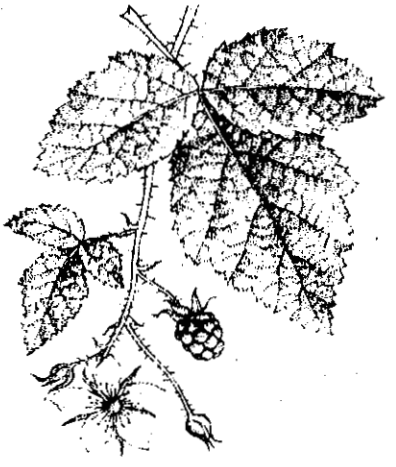

Valerie Kells,
from *The Natural History of Big Sur*

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Kids in Creeks
Kids in Gardens

Santa Clara County Workshop Schedule
Summer/Fall 2000

Environmental Workshops for Teachers

Summer/Fall 2000 Workshops for Educators of Grades K-12

Enrollment Open to All Educators (formal and non-formal) Working in Alameda County

Kids in Gardens

When: Saturdays, July 22 and 29, 2000
Time: 9:00 A.M.–4:30 P.M.
Where: Richmond Field Station, Richmond and Park Day School, Oakland
Cost: $25

Kids in Creeks

When: Saturdays, October 14 and 21, 2000
Time: 9:00 A.M.–4:30 P.M.
Where: Amador Valley High, Pleasanton, 2nd weekend location to be announced
Cost: $25

Valerie Kells, from *The Natural History of Big Sur.*

Participants In Each Workshop Receive:

- Classroom and Field Activities
- A Binder of Curriculum and Resources
- Free Use of Lending Library (videos and curriculum, reference books, salmon and frog suits, maps, and stream inventory kits)
- Easy access to grant funds for Action Projects
- Academic Credit from CSU Hayward—Sign up at the workshop!
  Kids in Creeks/Kids in Gardens: 1.5 units, $60, upon completion of a 2 page paper
- A **$150 stipend** for attending both days and completing a project with students

The *Kids in Creeks* program is funded by the Alameda Countywide Clean Water Program.
The *Kids in Gardens* program is funded by the California Department of Pesticide Regulation and the Alameda Countywide Clean Water Program. Both programs are implemented by the Aquatic Outreach Institute, as part of these organizations' overall efforts to enhance and protect the health of local watersheds, creeks, and the San Francisco Bay.

California Department of Pesticide Regulation

The Alameda Countywide Clean Water Program is a consortium of local agencies including Alameda County and the cities of Alameda, Albany, Berkeley, Castro Valley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, San Lorenzo, and Union City.

Kids in Gardens

***Kids in Gardens* will provide teachers with information on how to:**

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- develop theme gardens such as butterfly, hummingbird, schoolyard wildlife habitat, or organic vegetable gardens

Participants will:

- create worm bins that demonstrate natural cycles of decay and regeneration
- learn how to attract beneficial insects and birds
- design garden journals
- propagate native plants

Comments from former *Kids in Gardens* participants:

"The worm bin is great. I appreciate the instruction in propagation, seed preservation, and classroom activities. You have all done a fantastic job in organizing this information. Many thanks." —*Mary Holt, Novato Charter School*

"Time well spent. Informative, inspirational, well-paced." —*Elsie MacCracken, Mira Vista Elementary, Richmond*

"The encouragement and support in starting a garden project is invaluable." —*Mary Ann Parins, Concordia Elementary, Martin*

Yes! I am interested in attending the *Kids in Creeks* or the *Kids in Gardens* Workshop

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Please Note: *Both workshops are two days long.*

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Your Name: _____

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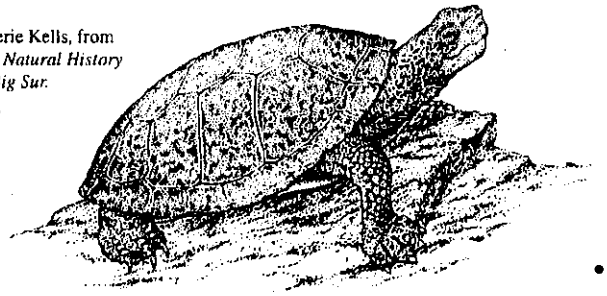

Valerie Kells, from *The Natural History of Big Sur.*

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- receive a resource binder full of creek activities, background information about wetlands and the Bay, local contacts and field trip sites, and funding sources
- receive access to AOI's Lending Library: videos, reference and activity books, and stream inventory kits

NEW! Follow-Up Assistance Plan for Kids in Creeks Participants:

- Teachers receive a $150 stipend for completing an action project with their students.
- After the workshop, AOI staff will visit your school to provide project assistance.
- Two reunions will be held for more in-depth training, idea sharing and networking.

Components of *Kids in Creeks* and *Kids in Gardens:*

Thematic Framework

The *Kids in Creeks/Kids in Gardens* framework can be used to teach about wetlands, gardens, and watersheds across the curriculum through History, Art, English, Geography, Math, and Science.

Action Projects

Participants will be provided with assistance in developing and conducting community action projects. Sample projects that classes might undertake include:

- developing a wildlife habitat garden to be certified by the National Wildlife Federation
- creating cultural or natural history booklets on local wetlands
- designing garden or creek murals for schools or local community centers
- holding a creek clean-up day and watershed celebration
- stenciling storm drains
- writing and illustrating field guides of native plants and animals
- raising Pacific chorus frogs in the classroom
- monitoring a local creek

Educators' Plans for Teaching about Creeks and Gardens:

"I took my inspiration from the workshop and decided to incorporate it in my classroom. My curriculum plans are to integrate science, literature, and art to teach the students about the world around them. My goal is for the students to learn how water, soil, and plants are all connected, and what we do at home and at school can affect that cycle. In May, for Open House, we will display a sample of all our projects, artwork, and our growing desktop gardens. Hopefully, the students will be eager and excited to bring their parents to school to learn."–*Linda Larsen, Jack London Elementary, Antioch*

"As a middle school Social Studies and English teacher, I have rarely brought science into my classroom. However, that is all about to change. After completing the *Kids in Creeks* workshop, I have discovered numerous ways to implement science into my 6th grade CORE curriculum."
—*Jennifer Barnwell, Riverview Middle School, Bay Point*

"I attended the *Kids in Gardens* workshop with my entire science department. Our department was so inspired that we went back to our site and approached our principle for a garden site. We managed to find the perfect spot, got our principle on our side, and wrote a grant to support phase I of the school's dream garden." –*Melissa Wrinkle, San Jose Middle School, Novato*

Aquatic Outreach Institute
1327 South 46th Street #155
Richmond, CA, 94804

ADDRESS CORRECTION REQUESTED

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ORGANIZATION
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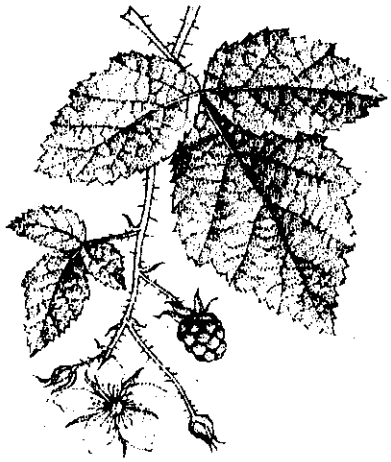

Valerie Kells,
from *The Natural History of Big Sur*

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Please Post and/or Distribute

Kids in Creeks
Kids in Gardens

Alameda County Workshop Schedule
Summer/Fall 2000

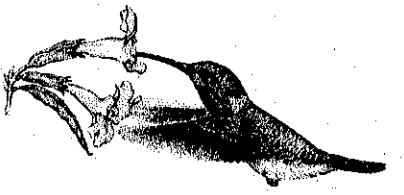
Kids in Gardens

Please Post and/or Distribute

Fall 2000 Workshop for Educators of Grades K–12

Enrollment open to all educators (formal and non-formal) working in Solano or Napa Counties

When: October 21 and October 28, 2000
Where: Loma Vista Farm and Garden Center, Vallejo, and Location To Be Announced, Napa
Cost: $25 to reserve a space
Stipend: $150 for doing a follow-up project



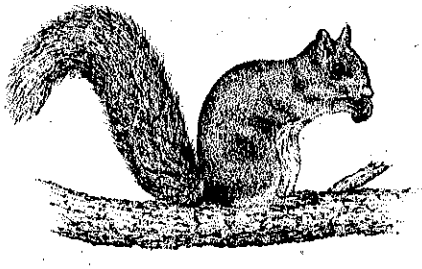
WHAT YOU'LL LEARN

- Learn how to create healthy, low maintenance gardens, propagate native plants to create wildlife habitats, attract beneficial insects and get rid of garden pests without harmful chemicals, recycle yard wastes and table scraps to make compost, and garden with less water.

WHAT YOU'LL RECEIVE

- **Activities**—Learn how to conduct interdisciplinary, year-round, garden-based activities and create a variety of "theme" gardens such as butterfly, native plant, vegetable, and schoolyard wildlife habitat.
- **Community Contacts**—Hear from representatives of Bay Area organizations on resources and techniques for working with school groups.
- **Free Worm Boxes**—Create your own worm composting system and use worms to demonstrate natural cycles of decay and regeneration.
- **Access to Lending Library**—Borrow videos, reference and curriculum books at no charge.
- **Curriculum and Resources**—Receive curriculum guides and a binder of garden activities that include extensive resources for supplies, local garden contacts, and funding sources.
- A **$150 stipend** for attending both days and completing a project with students

KIDS IN GARDENS WILL HELP YOU



All graphics by Valerie Kells from *The Natural History of Big Sur*

- Carry out projects that encourage students to solve problems, work cooperatively, and develop an appreciation of natural systems and stewardship of the land.
- Engage learners in hands-on investigations of the natural world.
- Understand and teach the values of gardening with California native plants.

THIS WORKSHOP WILL FILL, SO REGISTER EARLY!

Excerpts from Participant Evaluations:

Please Post and/or Distribute

"Thank you for one of the best workshops I've ever enjoyed, a shot in the arm." —*Charlene McPherson, Country Club Elementary, San Ramon*

"I'd give up any number of Saturdays for more of this. Thanks."
—*Pam Bailes, Joaquin Moraga Intermediate*

This *Kids in Gardens* workshop is sponsored by the California Department of Pesticide Regulation, the Fairfield-Suisun Sewer District, Solano County Integrated Waste Management Task Force, Vallejo Storm Water and Flood Control, City of Vacaville Water Quality, and the City of Napa.

CITY of NAPA

California Department of Pesticide Regulation

Marshes to Mountains and in between — HELP KEEP SOLANO COUNTY CLEAN

VALLEJO SANITATION & FLOOD CONTROL DISTRICT

VACAVILLE

Aquatic Outreach Institute
1327 South 46th Street #155
Richmond, CA, 94804

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Kids in Gardens

Solano and Napa County Educators—Oct 21 & Oct 28, 2000

Form

Yes! I am an educator working in Solano or Napa County and would like to register for the <u>two-day</u> Kids in Gardens workshop. I have enclosed a **non-refundable** check, payable to the Aquatic Outreach Institute, for $25 to reserve a space.

Your Name: _____

School Name: _____

School Address: _____ School City: _____

School Zip: _____ School Phone: _____

E-mail: _____ Fax: _____

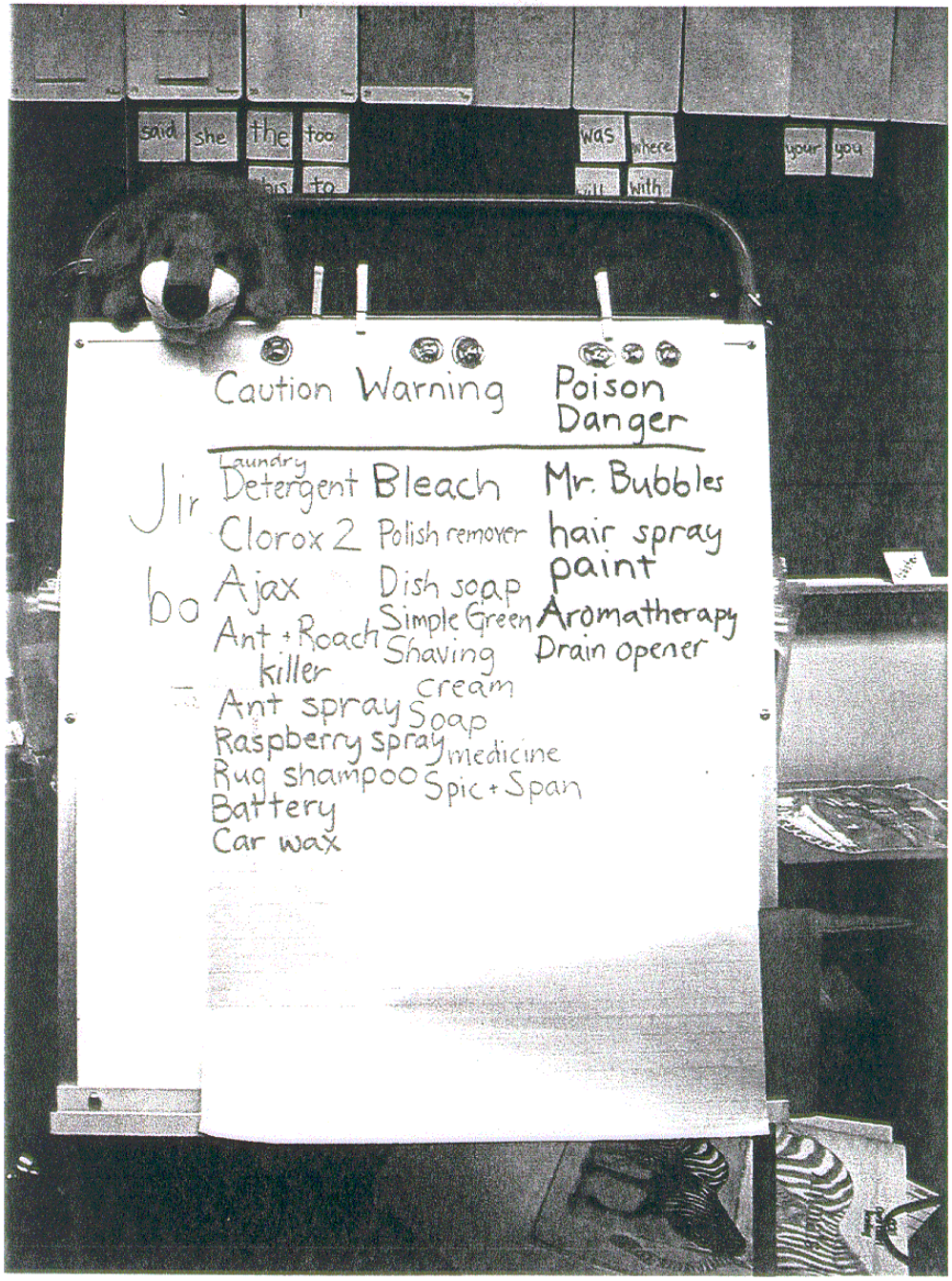
Home Address: _____ Home City: _____

Home Zip: _____ Home Phone: _____

Number of students you work with: _____ Type of gardening you are interested in? _____

Mail to: *Kids in Gardens*, Aquatic Outreach Institute, 1327 South 46th Street #155, Richmond, CA, 94804
For more information, please call: Sharyl McGrew at (510) 231-5783

Manzanita Elem
Oakland, CA
Laura Arnow

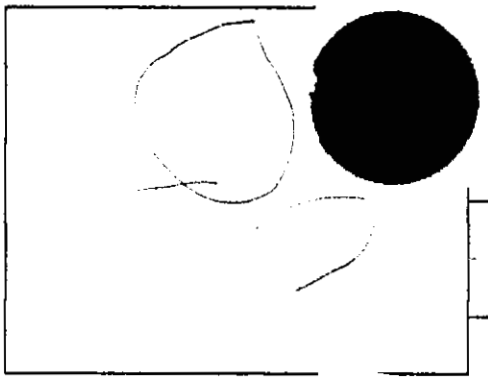


Name: [illegible]

Look at your house for at least 3 liquids and powders that are YUK. You can tell by the label words:

CAUTION WARNING DANGER POISON

Draw the container. Copy the name of the liquid or powder and its warning word. Put a Mr. Yuk sticker on the package.

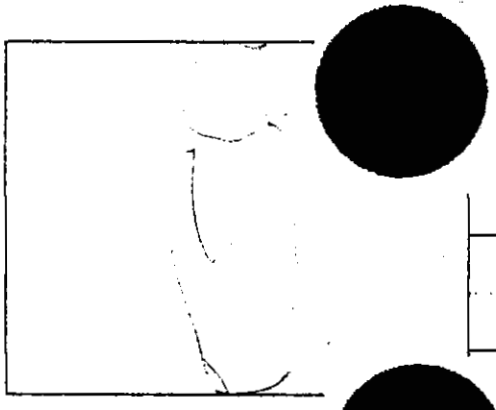


Tide

Liquid or powder name

Caution

YUK word

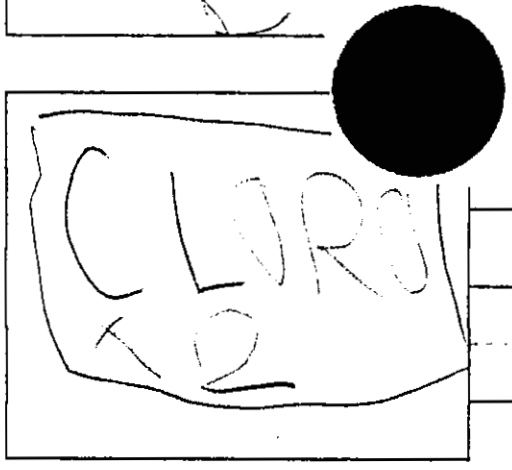


Lava

Liquid or powder name

Warning

YUK word



CLOROX 2

Liquid or powder name

CAUTION

YUK word

Aquatic Outreach Institute

155 Richmond Field Station
1327 South 46th Street
Richmond, CA 94804
(510) 231-5655 phone
(510) 231-5703 fax
www.aoinstitute.org

June 13, 2000
FOR IMMEDIATE RELEASE
CALENDAR LISTING—Summer/Fall 2000

The following is a list of Summer/Fall activities for Alameda County Educators being held by the Aquatic Outreach Institute.

Kids in Gardens
Saturdays, July 22 & 29, 2000 from 9:00 a.m.–4:30 p.m.
This two-day workshop will be held at the Richmond Field Station in Richmond and Park Day School in Oakland, and is open to all K–12 "educators" working in Alameda County. Participants will learn how to create healthy, low-maintenance gardens, propagate native plants to create wildlife habitats, attract beneficial insects and get rid of garden pests without harmful chemicals, recycle yard wastes and table scraps to make compost, and garden with less water. Pre-registration is required for $25, which includes a curriculum guide and extensive resource materials. A $150 stipend will be awarded to participants for attending both days and completing a project with students. Academic credit is also available through California State University, Hayward. For more information or to register, please contact the Aquatic Outreach Institute at (510) 231-5783.

Kids in Creeks
Saturdays, October 14 & 21, 2000 from 9:00 a.m.–4:30 p.m.
This two-day workshop will be held at Amador Valley High School in Pleasanton and Frederickson Elementary School in Dublin, and is open to all K–12 "educators" working in Alameda County. Participants will engage in hands-on activities to learn about aquatic insects, pollution prevention, animal tracking, storm drain stenciling, and more. Pre-registration is required for $25, which includes a curriculum guide and extensive resource materials. A $150 stipend will be awarded to participants for attending both days and completing a project with students. Academic credit is also available through California State University, Hayward. For more information about the workshop or to register, please contact the Aquatic Outreach Institute at (510) 231-5784.

Eleventh Annual Creeks, Wetlands, and Watersheds Conference
Saturdays, October 14 & 21 and November 4 & 11, 2000
This year's conference will consist of a series of field trips at various locations throughout the Bay Area covering an array of topics, such as ecosystem-based landscape management, aquatic insect monitoring, hands-on creek restoration techniques, and marsh canoe trips. Participants may choose to attend between one and four trips. The conference is open to educators and the general public. Pre-registration is required for $25 per trip. Academic credit is also available through California State University, Hayward. For more information about the *Creeks, Wetlands, and Watersheds Conference*, or to register, please contact the Aquatic Outreach Institute at (510) 231-5778.

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Aquatic Outreach Institute

1327 South 46th Street
155 Richmond Field Station
Richmond, CA 94804
(510) 231-5655 phone
(510) 231-5703 fax

July 21, 2000
FOR IMMEDIATE RELEASE

Contact: Sharyl McGrew
Day: (510) 231-5783

GARDEN FRIENDS AND FOES — CREATING HEALTHY SCHOOL GARDENS

A new program for teachers in Santa Clara County is about to bring innovative organic gardening techniques and curriculum to the classroom. *Kids in Gardens* is a collaborative venture by the City of San Jose, the California Department of Pesticide Regulation and the Aquatic Outreach Institute that will train educators in methods of safe gardening practices in order to reduce pesticide use at schools and in the community.

In this two-day, hands-on workshop educators will learn how to conduct activities and projects with their students, such as how to engage students with activities in the natural world, starting a school garden, creating a habitat for birds, butterflies and wildlife using native plants, and educating families about how to implement safe gardening practices at home. Participants will learn about the connection between pesticides and urban runoff pollution and how citizens can play a role in reducing pesticide use through safe pest management.

Educators who attend both days of the workshop, complete a pollution prevention project with their students and submit a report, will receive a $150 stipend.

Those attending the workshop will receive an extensive resource binder which includes activities which can be easily performed with students, and instructions on how to conduct gardening projects. They will also receive activity and reference guides on gardening, growing native plants, and Integrated Pest Management.

This two-day workshop will be held on successive Fridays, August 4 and 11, from 9:00 a.m. to 4:30 p.m. at the Hacienda Elementary School in San Jose. Space in the workshop is limited, so register quickly. The cost for attending is $25. For more information contact Sharyl McGrew at the Aquatic Outreach Institute at (510) 231-5783.

###

EBMUD Currents

THE NEWSLETTER OF PROJECT WATER - EAST BAY MUNICIPAL UTILITY DISTRICT - SPRING 200

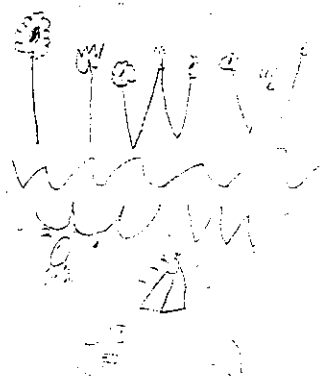
Calendar

- ***Kids in Gardens.*** Saturdays, March 3 and 10, 2001, at Mira Vista Elementary School in Richmond, from 9:00 a.m. until 4:30 p.m. Participants will engage in hands-on activities to design, implement and manage a successful classroom or school garden. Creating worm bins, attracting beneficial insects and birds and propagating native plants are among the aspects of this dynamic workshop. Sponsored by EBMUD, the Contra Costa Clean Water Program, the cities of El Cerrito, Pinole, Moraga, Orinda and Richmond, and the Contra Costa Water District, enrollment is limited to educators working in Contra Costa County.

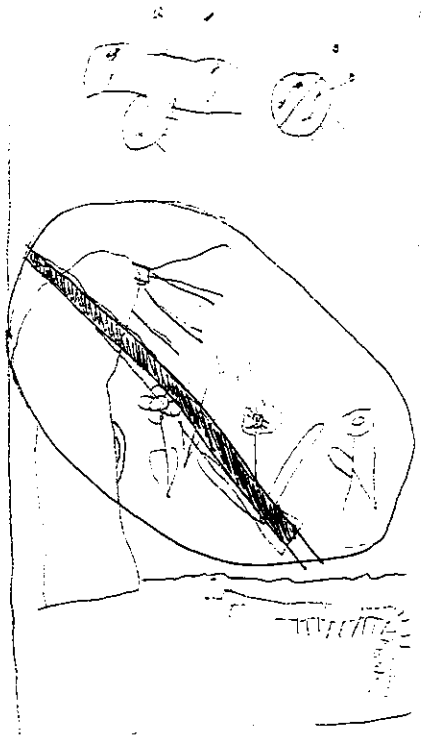
  The same two-day workshop, funded by Alameda Countywide Clean Water Program, the California Department of Pesticide Regulation and EBMUD, is available for educators working in Alameda County. Workshops will be Saturday, March 24, at Canyon Middle School in Castro Valley and Saturday, March 31, 2001, at Vannoy Elementary School in Castro Valley. A $25 fee is required to reserve space. Academic credit is available from CSU Hayward for an additional fee. Contact Sharyl McGrew at (510) 231-5783 or e-mail *sharyl@aoinstitute.org*.

Pesticides can kill people, animals and good bugs.

Why Room 28 Decides To Make This Brouchure To Tell Everybody Not to spray Poison on your yard!

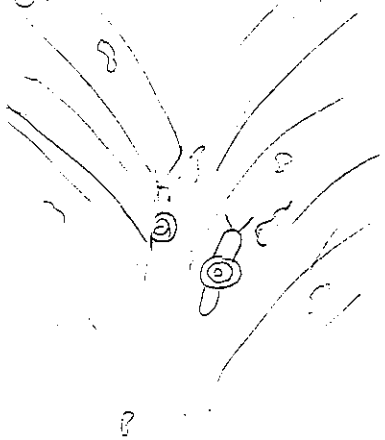


How To Take Care Of Your Garden!!!



Safe ways to Control Bugs:

-Mix soap with water to spray on plants wipe up with a sponge
-Pick the bugs off the plants
-Use safe, non-toxic products
-Use fly paper or insect traps

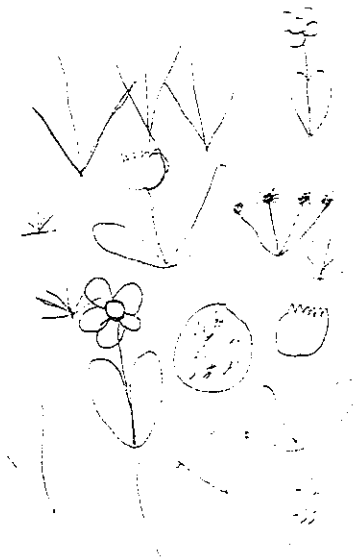


How to help your city with pesticides

Pesticides can harm some good things and people. Use non-toxic products and make your garden a healthy place.

Safe ways to control Weeds

Pull the weeds out.-Use mulch to keep weeds from growing



Backyard Bugs

What are "bugs"? The creepy crawly critters you find in *your garden* are really many different kinds of animals. You may not realize it, but bugs are an important part of your life. In fact, people couldn't live without them! Bugs pollinate our food crops and flowers, mix and fertilize soil, eat our garbage, and provide food for wildlife. There are *millions of different kinds of bugs*, and very few of them are pests that harm people or plants.

People sometimes use chemicals, called *pesticides*, to kill unwanted bugs in the garden. Unfortunately, some of these chemicals can also harm people, *pets and the helpful* bugs that pollinate plants and eat pests. You can keep your garden healthy by creating a safe home for the bugs and other *animals that eat* garden foes and pollinate plants. Just provide them with food and water, and avoid using pesticides in you wildlife habitat.

We are 3rd graders from Kitayama Elementary and we've been studying *about gardens*, composting, watersheds, and toxic effects on earth. We have put together this information to *help you find less toxic ways* to control bugs. Working as a team, we know it will make a difference!

Other Resources

Books

Compost Critters
Bianca Lavies, Dutton Children's Books, 1993.

Insects in the Garden
D.M. Souza, Carolrhoda Books, 1991.

On the Web

Insects of the S.F. Bay Region
http://www.cnr.berkeley,edu/explore

Young Entomologists Society, Inc.
http://members.aol.YESbugs/bugclub.html

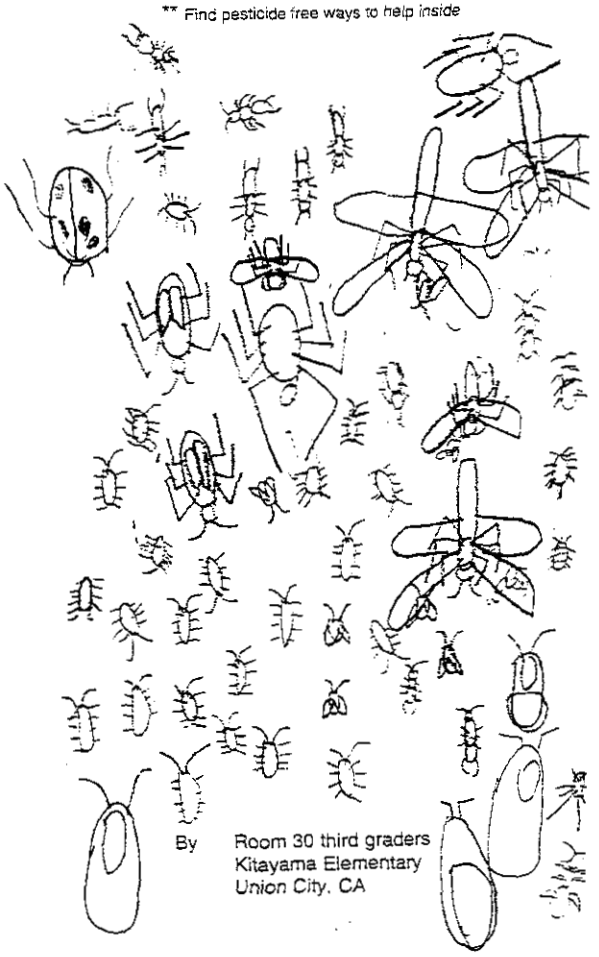
Others

Citizen's Guide to Pesticides
EPA; R. Woods,
Consumer Information Center-Y.
P.O. Box 100, Pueblo CO 81002
($0.50)
Request #426X

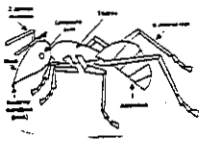
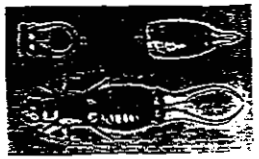
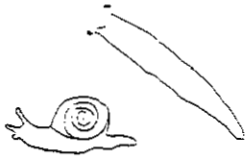
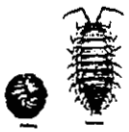
Natl. Pesticide Telecommunications Network
EPA-funded. For emergencies & information on health effects, 24 hr hotline:
1-800-858-7378

BUG INVASION!

** Find pesticide free ways to help *inside*



By Room 30 third graders
Kitayama Elementary
Union City, CA

Garden Foes	Picture	Detection	Possible Controls
Aphid	Aphid	- 1/12 of an inch long - Gather in large groups ~ when disturbed you will see cloud of insects around plants	- Use ladybugs - they eat aphids - Wipe off with gloved hand - Prune infested portions off plants - Don't over fertilize
Ant		- Oval with flattened body - Up to 3 or 4 inches long - Brownish gray or white - Overlap plates on body - Live in dark places - Some roll into ball when disturbed	- Remove / clean up whatever ants are after - Block all cracks and entries
Earwig		- Live in damp, dark places to help keep skin from drying out - After rain slugs come out of hiding places in garden	- Handpick and crush - Traps made from tuna cans containing half an inch of vegetable oil (they drown)
Snail / Slug		- Live in dark, dry places - Look for shiny brown with pinchers - Under flowerpots	- Hand pick - Bottle with leaves turned on side for them to crawl in then turn it up - Pour beer or mix water and commercial yeast in shallow pan - remove attracted snails - Use ground beetles - they will eat snails and slugs - Commercial bait in plastic tub with hole cut for entrance
Pillbug / Sowbug		- Live in large groups called colonies - Some are different colors - Some colonies have soldiers for protection - Ants protect certain plants & crops, they farm aphids	- Handpick and crush - Try keeping things dry since they like moisture
Whitefly	Whitefly	- Tiny oval shaped soft body - Can be green, pink, or black - Found in clusters at growing season on young shoots - Such plant sap and damage plants	- Use yellow sticky traps - Vacuum plants when air is cool - Prune badly infested leaves

APPENDIX II

Workshop Agenda

Kids in Gardens
Workshop Agenda

Saturday, July 22, 2000
Richmond Field Station
Richmond

Saturday, July 22, 2000

8:45 - 9:00	Registration/Snacks, Coffee, Tea
9:00 - 9:15	Welcome & Announcements
9:15 - 9:30	Community Contacts & Why We're Here *Nita Davidson, California Department of Pesticide Regulation*
9:30 - 10:00	Breaking Ground: Creating Healthy School Gardens *Sharyl McGrew, Aquatic Outreach Institute*
10:00 - 10:30	Meet the Garden *Billi Romain, Environmental Consultant*
10:30 - 10:45	Coffee Break
10:45 - 11:45	As the Soil Turns: Keeping Garden Soil Healthy *Sharyl McGrew*
11:45 - 12:15	Lunch
12:15 - 1:00	Are You Me? Game & Introductions *Sharyl McGrew*
1:00 - 1:45	The Rotten Truth: Building a Compost Pile *Claudia Taurean, Alameda County Waste Management Authority*
1:45 - 2:30	Wild & Wiggly: Building a Worm Bin *Billi Romain*
2:30 -2:45	Coffee Break
2:45 - 4:00	Plant Parenthood: Choosing Appropriate Plants and Propagation *Sharyl McGrew*

4:00 - 4:15 Jigsaw Poetry

4:15 - 4:30 Evaluation, Homework, Wrap-Up, and Coming Attractions

Kids in Gardens
Workshop Agenda

Saturday, July 29, 2000
Park Day School
Oakland

Saturday, July 29, 2000

8:45 - 9:00	Registration/Snacks, Coffee, Tea
9:00 - 9:15	Welcome & Announcements
9:15 - 9:45	Creating a Watershed in Your Hand/Your Environment at a Glance *Sharyl McGrew*
9:45 - 10:00	Perilous Poisons: Pesticides in the Food Chain *Billi Romain*
10:00 - 10:15	Pollution Soup *Sharyl McGrew*
10:15 - 10:30	Coffee Break
10:30 - 12:00	Friend, Foe, or Escargot: Integrated Pest Management *Billi Romain*
12:00 - 12:30	Lunch
12:30 - 1:15	Resource Safari *Sharyl McGrew*
1:15 - 2:00	Growing Wild: Gardening for Butterflies *Sharyl McGrew*
2:00 - 2:15	Coffee Break
2:15 - 2:45	Developing a Sustainable Garden at Your School *Tom Little, Park Day School*
2:45 - 3:30	Action Planning *Sharyl McGrew & Billi Romain*
3:30 - 4:15	The Growing Curriculum: Linking Art to Gardening *Schuyler Fishman, Project Create*
4:15 - 4:30	**Evaluation & Wrap-Up**

Kids in Gardens
Workshop Agenda

Friday, August 4, 2000
Hacienda Science Magnet
San Jose

Friday, August 4, 2000

8:45 - 9:00 Registration/Snacks, Coffee, Tea

9:00 - 9:30 Welcome & Announcements

9:30 - 10:00 Breaking Ground: Creating Healthy School Gardens
Sharyl McGrew, Aquatic Outreach Institute

10:00 - 10:30 Meet the Garden
Seanain Snow, Consultant

10:30 - 11:00 Hacienda Garden Project
Carolyn Flanagan, Hacienda Science Magnet

11:00 - 11:15 Coffee Break

11:15 - 12:15 As the Soil Turns: Keeping Garden Soil Healthy
Sharyl McGrew & Seanain Snow

12:15 - 12:45 Lunch

12:45 - 1:00 Community Contacts
Michele Young, City of San Jose Environmental Services Department

1:00 - 1:45 Wild & Wiggly: Building a Worm Bin
Michele Young

1:45 - 2:30 The Rotten Truth: Building a Compost Pile
Sarah Smith, SC County Master Composter

2:30 -2:45 Coffee Break

2:45 - 4:00 Plant Parenthood: Choosing Appropriate Plants and Propagation
Sharyl McGrew

4:00 - 4:15 Jigsaw Poetry

4:15 - 4:30 Evaluation, Homework, Wrap-Up, and Coming Attractions

Kids in Gardens

Workshop Agenda

Friday, August 11, 2000
Hacienda Science Magnet
San Jose

Friday, August 11, 2000

8:45 - 9:00 Registration/Snacks, Coffee, Tea

9:00 - 9:15 Welcome & Announcements

9:15 - 9:45 Creating a Watershed in Your Hand/Your Environment at a Glance
Sharyl McGrew

9:45 - 10:00 Perilous Poisons: Pesticides in the Food Chain
Seanain Snow

10:00 - 10:15 Pollution Soup
Sharyl McGrew

10:15 - 10:30 Coffee Break

10:30 - 12:00 Friend, Foe, or Escargot: Integrated Pest Management
Seanain Snow

12:00 - 12:30 Lunch

12:30 - 1:00 Resource Safari
Sharyl McGrew

1:00 - 1:45 Growing Wild: Gardening for Butterflies
Sharyl McGrew

2:00 - 2:15 Coffee Break

2:15 - 3:30 Developing a Sustainable Garden at Your School/Action Planning
Seanain Snow
- *Carolyn Craft, Santa Clara County Master Gardeners*
- *Darlene Doak, Hacienda Science Magnet*

3:30 - 4:15 The Growing Curriculum: Linking Art to Gardening
Sharyl McGrew

4:15 - 4:30 **Evaluation & Wrap-Up**

Kids in Gardens

Workshop Agenda

Saturday, October 21, 2000
Loma Vista Farm and Garden, Vallejo

Saturday, October 21, 2000

8:45 - 9:00	Registration/Snacks, Coffee, Tea
9:00 - 9:30	Welcome, Announcements & Introductions
9:30 - 9:45	Community Contacts *Nita Davidson, California Department of Pesticide Regulation*
9:45 - 10:15	Breaking Ground: Creating Healthy School Gardens *Sharyl McGrew, Aquatic Outreach Institute*
10:15 - 11:00	Meet the Garden *Seanain Snow, Garden Educator & Thom Arcadi, Loma Vista Farm and Garden*
11:00 - 11:15	Coffee Break
11:15 - 12:15	As the Soil Turns: Keeping Garden Soil Healthy *Sharyl McGrew*
12:15- 12:45	Lunch
12:45 - 1:30	The Rotten Truth: Building a Compost Pile *Rita LaRoy, VALCORE*
1:30 - 2:15	Wild & Wiggly: Creating a Worm Bin *Sharyl McGrew*
2:15 -2:30	Coffee Break
2:30 - 4:15	Friend, Foe, or Escargot: Integrated Pest Management *Seanain Snow*
4:15 - 4:30	Evaluation, Wrap-Up, Homework and Coming Attractions

Kids in Gardens
Workshop Agenda

Saturday, October 28, 2000
West Park Elementary, Napa

Saturday, October 28, 2000

8:45 - 9:00	Registration/Snacks, Coffee, Tea
9:00 - 9:15	Welcome & Announcements
9:15 - 9:30	Community Contacts *Jason Nortz, City of Napa*
9:30 - 9:45	Perilous Poisons: Pesticides in the Food Chain *Tamara Shulman, Aquatic Outreach Institute*
9:45 - 10:15	Pollution Soup *Sharyl McGrew*
10:15 - 10:30	Coffee Break
10:30 - 11:15	Binder Safari *Tamara Shulman*
11:15 - 12:00	Growing Wild: Gardening for Butterflies *Sharyl McGrew*
12:00 -12:15	Butterfly Bracelets: Learning the Cycle of Life *Sharyl McGrew*
12:15 - 12:45	Lunch
12:45 - 1:45	Plant Parenthood: Propagating a Butterfly Garden *Sharyl McGrew*
1:45 - 2:00	Coffee Break
2:00 - 2:30	Creating a Garden Project at Your School *Lorraine Emberley, West Park School*
2:30 - 3:30	Taking Action: Planning Your Garden Project *Tamara Shulman*
3:30 - 4:15	Creating Garden Journals *Sharyl McGrew*
4:15 - 4:30	Evaluation & Wrap-Up

APPENDIX III

Workshop Participants

Kids in Gardens Workshop Participants

July 22, 2000 - Richmond Field Station
July 29, 2000 - Park Day School

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July 29, 2000 - Park Day School

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July 29, 2000 - Park Day School

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August 4 & 11, 2000

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West Park School, Napa
October 21 & October 28, 2000

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October 21 & October 28, 2000

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APPENDIX IV

Workshop Evaluations

Kids in Gardens
Day 2 Evaluation

Name (optional) Jeanne Rusch. School Ormondale
Grade 1-5 science Date 8/7/00
Number of Students You Work With 400 City You Work In Portola Valley

---

Please circle the number which represents your reaction to each of the items below:

	Agree						Disagree
1. The speakers/presenters today were well prepared and informative	8	7	6	5	4	3	2	1
2. The activities presented today were useful	8	7	6	5	4	3	2	1
3. The workshop was well organized	8	7	6	5	4	3	2	1
4. This was a good workshop site	8	7	6	5	4	3	2	1
5. I feel more confident in my ability to teach about gardening and reducing pollution after this workshop		7	6	5	4	3	2	1
6. I will integrate pollution reduction activities into my curriculum		7	6 (As much as possible)	5	4	3	2	1
7. I would recommend this workshop to others	8	7	6	5	4	3	2	1
8. The *Kids in Gardens* resource binder material is useful	8	7	6	5	4	3	2	1
9. I intend to use some of the ideas and activities presented today in my classroom	8	7	6	5	4	3	2	1

10. Which activities

a. were most useful Crunched paper watershed, bioaccumulation activity, pollution soup, presentations were helpful. It all was great!

b. were least useful I enjoyed it all

c. needed more time well paced.

12. Comments

Excellent workshop, packed with useful info.

Kids in Gardens
Day 2 Evaluation

Name (optional) Maria Lye
~~Grade~~ Ages 2-5
Number of Students You Work With 35 16/day

School Building Blocks Pre-School
Date Aug 11, 2000
City You Work In Los Gatos

Please circle the number which represents your reaction to each of the items below:

	Agree						Disagree
1. The speakers/presenters today were well prepared and informative	7	6	5	4	3	2	1
2. The activities presented today were useful	7	6	5	4	3	2	1
3. The workshop was well organized	7	6	5	4	3	2	1
4. This was a good workshop site	7	6	5	4	3	2	1
5. I feel more confident in my ability to teach about gardening and reducing pollution after this workshop	7	6	5	4	3	2	1
6. I will integrate pollution reduction activities into my curriculum	7	6	5	4	3	2	1
7. I would recommend this workshop to others	7	6	5	4	3	2	1
8. The *Kids in Gardens* resource binder material is useful and thorough	7	6	5	4	3	2	1
9. I intend to use some of the ideas and activities presented today in my classroom	7	6	5	4	3	2	1

10. Which activities

a. were most useful I really liked the hands on activities

b. were least useful —

c. needed more time I would've liked more time with everything

12. Comments

I think this work shop is amazing and would recomend it to my peers. You guys are awesome!!

Kids in Gardens
Day 2 Evaluation

Name (optional) Larissa Adam. School Manzanita
Grade 5 Date 7-21-00
Number of Students You Work With 31-33 City You Work In Oakland

---

Please circle the number which represents your reaction to each of the items below:

	Agree						Disagree
1. The speakers/presenters today were well prepared and informative	7	6	5	4	3	2	1
2. The activities presented today were useful	7	6	5	4	3	2	1
3. The workshop was well organized	7	6	5	4	3	2	1
4. This was a good workshop site !!	7	6	5	4	3	2	1
5. I feel more confident in my ability to teach about gardening and reducing pollution after this workshop	7	6	5	4	3	2	1
6. I will integrate pollution reduction activities into my curriculum	7	6	5	4	3	2	1
7. I would recommend this workshop to others	7	6	5	4	3	2	1
8. The *Kids in Gardens* resource binder material is useful yes! !!!	7	6	5	4	3	2	1
9. I intend to use some of the ideas and activities presented today in my classroom	7	6	5	4	3	2	1

10. Which activities

a. were most useful Insect survey in the garden; how to plant a butterfly garden; going over the binder; Q & A w/ Park Day School Director; planning time.

b. were least useful None

c. needed more time ∅

12. Comments

I gained so much from today's session. Excellent workshop!

Kids in Gardens
Day 2 Evaluation

Name (optional) Zaby School Emerald Elementary
Grade 4th Date 7/29/00
Number of Students You Work With 30 City You Work In Union City

Please circle the number which represents your reaction to each of the items below:

	Agree						Disagree
1. The speakers/presenters today were well prepared and informative	7	6	5	4	3	2	1
2. The activities presented today were useful	7	6	5	4	3	2	1
3. The workshop was well organized	7	6	5	4	3	2	1
4. This was a good workshop site	7	6	5	4	3	2	1
5. I feel more confident in my ability to teach about gardening and reducing pollution after this workshop	7	6	5	4	3	2	1
6. I will integrate pollution reduction activities into my curriculum	7	6	5	4	3	2	1
7. I would recommend this workshop to others !	7	6	5	4	3	2	1
8. The *Kids in Gardens* resource binder material is useful ! !	7	6	5	4	3	2	1
9. I intend to use some of the ideas and activities presented today in my classroom	7	6	5	4	3	2	1

10. Which activities
    a. were most useful beneficial bugs / native plants
    b. were least useful N/A
    c. needed more time

12. Comments

Great workshop!
Great resources and ideas!
Well organized!
Thank you!

APPENDIX V

Academic Credit Paper

After having taken the "Kids in Gardens" workshop, I have come away with a wealth of information, knowledge, and resources which will be applied to my classroom instruction on an on-going basis. The application of the curriculum presented in the workshop will be two-fold. Through the garden, various academic standards will be addressed, and a Service Learning project will evolve at our school.

Service Learning is a teaching strategy whereby students gain a better understanding of academic content by applying their skills and knowledge to benefit society. The fourth grade at Emanuele Elementary is taking the opportunity that the garden presents to fulfill a Service Learning requirement. The garden will provide a site for hands-on learning. Students will achieve a better appreciation of how food is grown, learn about food safety and storage, and participate in lessons and activities designed to teach them about the importance of protecting the environment. The service that the students will provide will include nutrition (in conjunction with the cafeteria program) and caring for the environment.

Emanuele Elementary has already invested over $1,000 in materials to build our school garden. Teachers and community members have also given of their time, money, and talents to help start the garden project. Many members of the staff are committed to maintaining the project. In addition, we have been "adopted" in a community partnership by the local Home Depot. Their support will include education, labor, and materials. We are looking forward to the growth of our school/community garden.

One of the focuses of the garden will be to help students achieve a better understanding of their environment and the ways in which they can use integrated pest management techniques to benefit the garden. As an introduction, they will do the "meet the garden" activity. After the students record their observations, I will keep

them as a sort of comparison point for when they do a similar activity at the end of the year. My goal is that through this exercise I will be able to assess the students progress in their understanding of garden issues. Throughout the year, the students will engage in simple activities such as "earth as an apple", as well as in more involved projects such as surveying and learning about pesticide use. As they learn about the effects of pesticides on the environment, they will participate in activities such as "pest patrol" , "friend, foe, or escargot", and others which will encourage the desire to apply integrated pest management techniques in the garden project.

I will direct the students in their learning and eventually help them decide on an action project. I do not want to tell them what their project should be, but rather would like to inspire and guide them as they develop a project which they will embrace because it will have come from their desire to educate the community.

As a result of all the aforementioned, the children will have begun a sustainable garden project which enhances the academic curriculum through social awareness and responsibility to the environment.

Kids in Gardens

Several weeks ago, I attended the Kids in Gardens workshop presented by the Aquatic Outreach Institute. I left the workshop loaded with invaluable information that I could pass on to my students, ideas for integrating the workshop materials into my science curriculum, and inspiration to start a garden at my school.

To begin with, the workshop armed me with many facts about non-point source pollution. Before taking this class, I had only a vague notion that urban run-off contributes so greatly to the poisoning of our creeks, bays, and the ocean. I learned that by reducing (or better yet, eliminating) pesticide use in the garden, we will provide a healthier environment for insects, fish and birds. Instead of using so many lethal pesticides, we can plant flowers that attract beneficial insects, use compost to boost plants' natural immunity, or use safer methods such as horticultural oils. In addition, we will reduce dangerous algae blooms and general toxicity if we utilize fewer synthetic fertilizers. Instead, we can more closely approximate natural levels of nitrogen and other elements (such as phosphorus and iron) by fertilizing our gardens with home-made compost. In the process, we would also be reducing waste sent to the land fill as well.

We can also maintain healthier bodies of water by reducing usage of dangerous chemicals in our homes. For instance, we should use phosphate-free detergents, since phosphates harm fish (and thus

birds). Or we can clean with baking soda rather than bleach, and vinegar instead of ammonia. There are countless seemingly small ways that we can eliminate or reduce non-point source pollution, and if we all do this, it will have a huge impact on the health of animals and plants in all environments, but particularly aquatic habitats.

I am particularly excited about teaching this last point to my students, and want to empower them to effect change in their neighborhood. I see two areas of my science curriculum where I could effectively introduce the facts about non-point source pollution. In the fall, we will study a FOSS unit about environments, and plants' and animals' adaptations to different stimuli and environmental factors. We can examine the effects of pesticides on the environment by looking back at the effects of DDT, and study the current issue of banning Dursban and other pesticides. In the winter, we will do a unit on landforms. This includes studies of the flow of water and effects of erosion, and it would be easy to introduce pesticides (food coloring) upstream, and demonstrate how the chemicals reach and become concentrated in the bay. While we are studying these two units, students and their families can complete the home pesticide surveys, and the class can determine how best to make our community more aware of non-point source pollution prevention.

Finally, I feel exited to start a garden at my school, and will use the garden to teach my students how to cultivate plants responsibly. Students can assist in identifying plants that will attract beneficial

insects, so that we can garden without pesticides. Students will be responsible for collecting green snack and lunch scraps to fill our compost and worm bins, so that we will not have to resort to synthetic fertilizers. I hope to build a partnership with a local group, such as "Friends of Sausal Creek", so that our class can grow native plants and help assist in restoration efforts on the banks of our local creek. The garden will be a powerful tool in creating a group of young citizens who are aware of non-point source pollution issues and empowered to prevent the poisoning of our water.

Monic Inderbitzen
Kids In Gardens
August 10, 2000

Gardening has become a popular means of teaching in the past ten years. The outdoor classroom provides hands-on activities that enrich all curricular areas and develop a sense of community and pride for all involved. Children with varying degrees of interest and experience, from all walks of life, come together to share ideas and painstakingly accomplish the creation of sustainable life.

Through the *Kids In Gardens* workshop and Integrated Pest Management I have learned the proper way to tend to a garden, whether at home or school. Before the workshop, I would go to the local hardware store and purchase the chemical pesticide that would guarantee, according to the label, an end to my home pest problem. I never really thought about the bigger picture. Where did all the sprays, powders, and granules go? Out of sight, out of mind. Now, all I see is our Pollution Soup activity (I can't wait to do it with my kindergartners. It is a great visual!).

My school started a garden last year. It is pretty modest right now, with each grade level receiving one bed, each teacher allowed two feet of working space. I didn't feel competent enough to be on the garden committee, knowing nothing about gardening, so I gave my thumb's up and watched from the sidelines. I wanted to become a more active participant in our garden. I have always wanted to have a garden, but I wasn't confident I could do it. The *Kids In Gardens* workshop came up, and I jumped at the chance. I thought that it would be the perfect opportunity to learn about the art of gardening and ease my way into our school garden. Now, I can't wait to go back to school and share my ideas with the committee.

Through fundraising activities and community support we resurrected seven raised beds and filled them with soil. In the fall, we will be ready to plant, but the question is, "What?" At the end of last year, each grade level completed a survey regarding that question. What would you like to plant and how does it relate to our curriculum? The results varied little. Some grade levels knew exactly what they wanted to do, the majority just wanted to plant flowers and vegetables. It would be a shame to waste what little space we have on sporadic ideas. We need to collaborate and work together as a school to establish a garden community.

Ideally, after looking at our curriculum, we will have to come together as a staff and decide cohesively what we are doing as a grade level. If we proceed with this project allowing each teacher to do what he/she wants we will never achieve a "school" garden. After looking through our resources, the possibilities are endless.

I believe each bed should have a theme, so that the children see a variety of garden types. According to curricula, Kindergarten should plant vegetables. Depending on the season, radishes and pumpkins do well. Radishes develop quickly and are very successful. A pumpkin's life cycle is simple and provides a wonderful observational tool. First grade studies the life cycle of a butterfly. What better than a butterfly garden! This will introduce some beneficial bugs into our gardens too. Second and Third grades study habitat and frogs. They can easily study the habitats of each garden and possibly experiment with some aquatic plants. Fourth grade studies native America and they know that they want to plant a native California garden. A native garden will help build our garden friend population, which will in turn deplete our garden foes. Fifth grade studies ecosystems, and a garden is perfect for that too.

Slowly our little garden will turn into something great. We already have a vermicomposting program started. Our long range goal is to compost all of our cafeteria waste. Referring to the worm bin case studies given to us as supplements in our binders, it was easy to calculate how big our schoolwide worm bin will have to be to accomplish this goal. We only have eight bins schoolwide right now, but we are gaining momentum. I am confident once we get the basics down, each year we will be able to add a new facet to our garden. Add to our school's beauty and to the community.

I am more consciously aware of my actions now. Every purchase I make, every action, I think about where what I am buying will end up. Not just the container, but its contents too. I have read through my wonderful resource binder and studied the less toxic alternatives to my garden woes. I have gone to the local hardware stores and nurseries to find some of the products listed in the binder. After a few days of searching, I finally found one nursery in my area that carries quite a few less toxic alternative pest control products. They label the products with little earth-friendly signs, so that they stand out to consumers. They have proven to be a valuable resource as well.

I know that I am only one person, and that I cannot change the world by myself. However, I can't seem to stop talking about the things I learned at the workshop. I can see a plant, and I know its name. I know that it is a California native. I know what that means and why it is important to plant a native. People can tell me about their snail problems, and I can show them how to make a beer trap. I can make a non-toxic spray that will get rid of powdery mildew on roses. All this from a person who knew nothing about gardening before the workshop! Okay, I am not saving the whole world. But, I am doing my little part in the big picture. What about you?

APPENDIX VI

IPM Curriculum

Perilous Poisons

Summary
In this role-playing game, students learn about bioaccumulation and how pesticides move through the food chain in a garden habitat.

Grades:	• K–7
Time:	• 30 minutes
Materials:	• several large squares of fabric (or jackets or bandannas) to represent pesticides, one square for each student in the class
Setting:	• classroom or outdoors

Background
When toxic pesticides are used in the garden to control an insect pest, they usually affect much more than the pest. In fact, pesticides and herbicides can have an impact on wildlife living miles away from where they are used. Pesticides and herbicides from gardens and agricultural lands can wash from yards and farms in runoff and enter storm drains. Pesticides and other toxic chemicals that enter these storm drains or are poured down household drains can empty into creeks which eventually empty into our Bay. These toxic materials can have a serious impact on the wildlife in these aquatic habitats as they moves through our waterways.

All living organisms are connected to each other and their physical environment in a fragile web of life—when one organism is affected, the changes can move through the food web and impact other organisms in that habitat. For example, some pesticides can be stored in the tissues of plants and animals and then be passed on through the food chain. Animals higher up in the food chain that eat large numbers of contaminated organisms will gradually accumulate greater amounts of the toxins in their systems. This process by which a chemical is concentrated as it moves up the food chain is called *bioaccumulation*.

One example of bioacculumation is illustrated by the use of the pesticide DDT. In the 1960s, pelicans nearly became extinct in California when DDT was sprayed on agricultural lands miles away from their ocean habitat. The DDT was washed by rain into streams and then into the ocean where it was taken up by zooplankton. Fish fed on millions of zooplankton, and they too absorbed the DDT. When the pelicans ate large numbers of fish, they built up large concentrations of DDT in their systems. The toxic pesticide inhibited the production of calcium, so the pelicans' eggs became weak and were easily crushed. As a result, pelican populations declined drastically, and the brown pelican was placed on the endangered species list. DDT has since been banned in the United States, but this pesticide is still produced in the U.S. and sold to other

countries. Even though this product is no longer used here, it is so long-lasting that it can still be detected in the environment.

Understanding the wide ranging impact our use of poisons in the garden and home can have is an important first step toward making a commitment to finding alternative and nontoxic methods of pest control.

As you play this game, you can adjust the numbers of students in each part of the food chain to match the numbers of students you are working with. The "Garden Web of Life" activity in this binder is a good introduction to this activity.

Activity

1. Imagine that you are a gardener who has been working hard to produce enough food to feed your family. One day when you are out working in the garden you notice that some insect pests have been damaging your crops. What do you do? Brainstorm some possible solutions.
2. Now imagine that you decide to spray a pesticide on your garden plants to kill this insect pest. Ask 12 students to stand up in a row to represent the plants. Each should hold a large square of fabric (or a jacket or bandanna) that represents the pesticide sprayed on them.
3. Along come some slugs who eat the leaves of many garden plants. As they eat, they ingest some of the pesticide. Have eight students stand in a row in front of the plants and take the fabric squares from them.
4. Now along come some lizards that live under rocks in the garden. They eat many garden pests, including slugs. Have six students stand in a row in front of the slugs and take the fabric squares from them.
5. Pretty soon a couple of garter snakes enter the garden looking for food. They eat the lizards. Have two students stand in front of the slugs and take the fabric squares.
6. Now a hawk starts to circle the garden looking for prey. It sights and eats the two garter snakes. Have one student stand in front of the snakes and take all the fabric squares.
7. After you discuss the results of the game, play it again but alter the habitat and food chain. For example, imagine that the pesticide has been washed into a creek where it moves from algae to insect larvae to frogs and then to herons.

Discussion

- How did the poison move through the food chain?
- Which animal was most affected by the poison? Why?
- What happens to beneficial insects and animals when pesticides are used in a garden?
- Do you think the gardener intended to have this kind of impact on the garden food chain?
- Can people be affected by accumulating pesticides?

- How can we avoid the use of pesticides, herbicides, and other toxic chemicals?

Branching Out

- Call or write to the County Household Hazardous Waste Program and research how to dispose of pesticides and herbicides and the types of poisons they most commonly receive. What do they do with the materials they take in? See Section 10 for information on how to contact the program.
- Create a mural to depict the way poisons can bioaccumulate in a variety of habitats.
- Look through news magazines and newspapers for articles on pesticide and herbicide use. Report on what you find and write letters to the editors of these publications to express your concerns and ideas.
- Research and report on animals that have been affected by the bioaccumulation of pesticides (pelicans, seals, peregrine falcons, and others). Are populations of these animals still threatened?

Weaving a Garden Web of Life

Summary
In this game, students learn how the living and nonliving components of a garden habitat weave together to form a complex web of life.

Grades:	• K–8
Time:	• 1 hour
Materials:	• pens, pencils, paper • a large ball of yarn or string • reference books (optional)
Setting:	• garden beds

Background
Studying a garden can provide students with a detailed look into a unique and complex ecosystem. A garden ecosystem is made up of an intricate balance of life between plants and animals that rely on the garden and each other for survival. Each plant, animal, and insect has a particular job or role that we call its *niche*. Plants are producers, providing food for other living things. Most animals and insects are consumers, relying on plants or other animals for food. Some consumers are plant-eaters (herbivores), and some are meat-eaters (carnivores). Some very special plants and animals are scavengers and decomposers, and work to break down plant and animals waste to return minerals and nutrients to the soil.

A food chain is a simple way to picture how energy moves through this system from producers to consumers to decomposers. In most ecosystems, many different food chains overlap to form an intricate food web. By creating a garden food web, students can observe the connections between the plants and animals of the garden, and can see how changes in a garden ecosystem, like the introduction of pesticides, can affect all of the animals living there.

Activity
1. Ask students to imagine that they have been given a large piece of land that is completely empty. Their challenge is to create a garden on this piece of land. Have them make a list all of the things they think they will need to create a successful garden habitat. As they list each part of the habitat, try to identify its role in the garden ecosystem. (See Background, on the previous page.)
2. Remind students that a garden is made up of many different living organisms, but it is also made up of *nonliving* components like sun, air, water, and minerals. The interactions of the living and nonliving parts of the garden,

and the way they depend on each other, form the garden ecosystem. Are there any other items students need to add to their list?

Here are some suggestions for things you might include in the garden ecosystem:

- *nonliving components*: sun, air, water, minerals, soil
- *producers*: lettuce, carrot, radish, watermelon, dill, lavender, snapdragon, aster, milkweed, apple, peach, oak
- *consumers*: snail, bee, butterfly, earthworm, ant, millipede, snake, lizard, salamander, toad, turtle, jay, owl, hawk, deer, rabbit, raccoon, ground squirrel, mole, fox, mouse, bat
- *scavengers/decomposers*: bacteria, fungus, mold, beetle, sow bug, turkey vulture

3. To weave your food web, have each student choose a living or nonliving part of the garden ecosystem to represent. Students should make a name tag or drawing of the plant, animal, or object they have chosen. On the tag, they can write down the name of the object, plant, or animal they represent, and their niche or job in the ecosystem (younger students can wear pictures of their animal or object).
4. Have the class stand or sit in a large circle. Where does all the energy to run the garden ecosystem come from? The student representing the sun will start the web by holding onto the loose end of the ball of yarn. Still holding onto the end of the yarn, the sun tosses the ball of yarn to a student that represents something that depends on the sun for survival, such as a plant.
5. The "plant" then holds onto the strand of yarn with one hand, and tosses the ball of yarn to someone else in the circle that represents something the plant needs to survive, or something that depends on the plant for survival. (For example, lettuce could toss the yarn to something it needs to grow, such as soil or water, or it could toss the yarn to an animal that depends upon it for food, like a rabbit.) Each student should explain their choice before they toss the yarn to the next player.
6. Some of the relationships might not be obvious at first. For example, plants depend on decomposers to return nutrients to the soil, and scavengers are some of the only things that eat large predators. If you get stuck, you can always throw the ball back to the sun, water, or soil.
7. Keep going, having each student retain their hold on the string as the ball is tossed to them. As the yarn ball criss-crosses from student to student, an intricate web is formed. When everyone is connected, you will have a web of life that represents the garden ecosystem.
8. When every student is holding a strand of the web, have them move back just enough to tighten the web. Ask one student to pull *gently* on the string—how many others are affected or can feel the pull on the string?
9. Now ask students to imagine that a pesticide used on the garden kills both insect pests and beneficial insects like pollinators. Have students representing insects killed by this chemical and any plants affected by this loss of pollinators drop their yarn. What happens to the web? What are some other factors that might alter the food web (drought, freezing temperatures, etc.)? **As you think of other changes, have the appropriate students drop their parts of the web.**

10. Try to think of ways you might restore your web (replant native plants, clean up urban runoff pollution). As you name the changes, have students pick up their strands to restore the web of life.

Discussion

- Which parts of the garden ecosystem are most affected by change?
- Do the changes have more impact when your web has many parts or fewer parts?
- Were you surprised by any of the connections you made?
- How are people affected by changes in this ecosystem?
- How are ecosystems affected by natural disasters like drought, disease, and fire, or by human actions like the use of pesticides and herbicides? How hard is it to restore an ecosystem?

Branching Out

- When you have completed the food web game, students can draw a picture of the part of the web they represented. Use the pictures to create a large mural of a garden habitat and recreate the web of life by using string to connect the drawings.
- Make a survey of the plants and animals that live in your garden and use them to play the web of life game.
- Research the environmental effects of pesticides and other garden chemicals and report on alternatives to using these chemicals.

Pesticide Poll

Summary
Students conduct a survey in their neighborhood to determine attitudes about pesticides and to discover how yard and garden chemicals are used in home gardens.

Grades:	• 3–8
Time:	• two or three 45-minute class sessions and one to two hours talking to neighbors around the school or at home.
Materials:	• pens, pencils, paper, and clipboards • Pest Control Poll, one copy for each person interviewed • Answers to the Pesticide Poll, one for each person interviewed • *Grow It! The Less Toxic Garden* one for each person interviewed—Available free from Bay Area Clean Water Programs, (888) BAY-WISE (optional)
Setting:	• classroom and student's neighborhood

Background
Throughout history people have relied on a variety of methods to control and repel pests. Egyptians used fumigation to control pests in their grain, Romans applied plant extracts to control body lice, and Native Americans in the Bay Area lined their acorn granaries with bay leaves to repel insect pests. Today we have several choices in the methods we can use to control garden pests. Some methods of control rely on chemicals to kill pests. But there are also many nonchemical methods of control which rely on hand-picking, barriers, traps, and the use of predators and pathogens.

Pesticides are poisons designed to kill or repel unwanted organisms such as insects (insecticides), weeds (herbicides), and mold or fungus (fungicides). Each year more than four billion pounds of pesticides are used globally.

When pesticides are used as a quick fix for controlling insect pests, they can cause serious health and environmental problems. These chemicals kill beneficial insects as well as pests in the garden and can remain in the soil for up to 20 years. In North America, pesticides are the single largest cause of surface water pollution. Runoff from agricultural land, residential lawns, and gardens carries these chemicals into our aquatic systems where they harm wildlife and can contaminate drinking water supplies. Pesticides that are poured down sinks or

drains are not filtered out at our sewage treatment plant and so they end up in the Bay. Pesticides that are washed off of lawns and gardens enter storm drains and wind up in our creeks.

Many people are not aware of the impact pesticides can have on the environment. People may purchase pesticides for many reasons: they are easy to use and do the job; neighbors use them; chemical controls are readily available at stores; and advertising convinces them to use these products. Unfortunately, many people do not stop to consider the benefits versus the risks. Every year up to two million people suffer from pesticide poisoning worldwide. In the U.S. alone, over 50,000 cases of pesticide poisoning are reported each year. A 1984 study made by the National Academy of Sciences found that 90 percent of all pesticides have never been tested for long-term health effects, and less than 1 percent of the U.S. food supply is tested for pesticides.

We need to consider how we use hazardous chemicals in our homes and to learn to compare their benefits with the cost to our health and the environment. The best way to reduce the urban runoff pollution and health risks associated with pesticides is to reduce or eliminate the use of pesticides, herbicides, and fungicides. In this activity, students help their neighbors become aware of the dangers associated with pesticide use and the alternatives available to them by conducting a poll.

Activity

1. Ask students to define the word *pest*. What are some pests you might find at home or in the garden? Are these plants or organisms always considered harmful? What role do they play in food chains and food webs?
2. Have students brainstorm and list some of the ways that people get rid of pests. Which methods of control rely on chemicals and which do not?
3. Ask students what they know about pesticides. Make a list of what students know and would like to know about the use of pesticides. Pass out copies of the Pesticide Poll and have students answer the questions. (Or, answer the questions as a whole class.)
4. Go over the answers as a class and discuss the benefits and risks of using chemical controls. Where did students learn about pesticides? Do their families use these chemicals at home?
5. Explain to students that they will be making a survey of family and neighbors to determine attitudes and knowledge about pesticides. Have students come up with a list of questions to ask, or use the Pesticide Poll included with this activity.
6. Discuss interviewing techniques and safety precautions. Will students interview in teams, be accompanied by an adult, interview people living near the school or neighbors at home, will they ask questions and circle the answers themselves or will they allow the person they interview to read and answer the survey on their own?
7. Have students determine how many people they will interview, then copy and pass out the appropriate number of Pesticide Poll survey forms. If you

will be passing out copies of the Answers to the Pesticide Poll, make copies of that sheet as well.

8. Have students conduct their interviews. (Optional: You might want to have your students order extra copies of *Grow It! The Less Toxic Garden* to hand out to each person they interview. A sample is included in your binder. *Grow It! The Less Toxic Garden* contains suggestions for controlling pests and plant diseases without the use of toxic chemicals. To order, call (888) BAY-WISE.
9. Once students have conducted their surveys, compile the information on a class bulletin board or graph and discuss the results. Based on your results, ask students to design some educational materials about alternatives to pesticide use that can be given to the people they surveyed. What are some alternatives to pesticides and herbicides currently in use?
10. After a few months, follow up your initial survey with another survey to see if people have changed their gardening habits based on what they have learned about pesticides.

Discussion

- What are the benefits and risks of using chemical controls of pests?
- Why might people choose chemical controls over nonchemical controls?
- Based on the results of your poll, how would you summarize people's attitudes toward chemical and nonchemical controls (easy, safe, dangerous, inexpensive, etc.)?
- Were most people familiar with the risks and benefits and safe methods for using the chemical products they purchased?
- Did any of the answers surprise you?
- What are some ways people might dispose of pesticides (dumping in backyard or pouring down sink, toilet, or storm drain, dropping off at a disposal site)? What are the risks associated with each method? How can people safely dispose of these chemicals?
- What kinds of things can surveys tell us? What kind of information would be hard to collect using a survey form?

Branching Out

- Bring some common lawn and garden chemicals (or just the labels) into the classroom. Have students list the active ingredients and the types of warnings on the labels.
- Have students write to their local city council and newspapers to let them know the results of their survey and the need for public education.
- Have students make a comparison of fruits and vegetables in local supermarkets and organic produce stores to determine differences in pricing and the types of varieties available. Compare the tastes and appearance of the produce. Have students use the results of their study to encourage their family to buy organic produce.

- Invite local experts from cooperative extension or local organic farms to speak to your class, parent organization, or community about pesticide-free gardening methods.
- Have students use their new knowledge to create clever messages about the need to reduce pesticides through slogans, buttons, posters, cartoons, and poetry. Post these messages at local garden centers and nurseries, city hall, and the library.
- Sponsor a communitywide pesticide-free garden award to recognize local gardeners who use organic methods.
- Start an organic garden and/or composting program on the school grounds. Use the site to teach the community about organic gardening methods that promote pesticide-free gardening.

Pesticide Poll
Please circle the correct answer.

Using Lawn and Garden Chemicals

1. Pesticides kill only bad insects.
   True False

2. The more insects your garden has, the less food you will be able to harvest.
   True False

3. Pesticides only affect the small area where they are applied.
   True False

4. Pesticides can remain in the environment for a very long time.
   True False

5. Once pesticides break down, they become less of a health hazard.
   True False

6. If a pesticide is sold in a nursery, it is safe to use.
   True False

7. Many insects have become resistant to pesticides in recent years.
   True False

8. Chemical controls of pests cost less than biological controls.
   True False

9. Organic gardening methods are not effective at reducing garden pests.
   True False

10. A mixture of different plants growing together can resist insect infestations better than a large area of one species of plant.
    True False

11. Pesticides are not harmful to people.
    True False

12. The proper way to dispose of unwanted pesticides is to pour them down the sink or toilet.
    True False

13. Pesticides are not used on school sites.
    True False

In Your Garden

1. Do you have a garden?
   Yes No
   What do you grow: vegetables fruits flowers grass other

2. Do you use pesticides on your lawn or garden?
   Yes No

3. Do you use nonchemical pest controls?
   Yes No
   What types of controls: _____
   _____

4. Do you read the warning labels on lawn and garden products before you buy them?
   Yes No

5. Would you be willing to pay more for organically grown produce?
   Yes No

6. Would you be willing to eat fruits and vegetables that have some spots or insect damage?
   Yes No

Answers to the Pesticide Poll

1. *Pesticides kill only bad insects.*
   FALSE. Pesticides do not target only the pests in a garden, they harm beneficial insects and animals like bees, butterflies, moths, and bats as well. Pesticides in soil can kill important decomposers like earthworms and bacteria. Pesticide residue can accumulate in the food chain and harm birds, fish, and other animals, including pets.

2. *The more insects your garden has, the less food you will be able to harvest.*
   FALSE. Gardens are complex ecosystems that reflect an intricate balance of life between plants and animals. Most of the insects and animals you see in the garden are essential to the health of the plants—some pollinate plants, some are decomposers that break down dead plant material to return nutrients to the soil, and others are predators feeding on insect pests. Having a large insect population can actually be beneficial to your garden.

3. *Pesticides only affect the small area where they are applied.*
   FALSE. Pesticides can be washed into storm drains and sewers and enter untreated into our creeks, Bay, and Delta, where they can harm aquatic life. Pesticides can also drift in the air and contaminate areas miles away from where they were applied. Traces of pesticides have been found in snow on top of mountains miles away from farmland and urban areas, in polar bears and seals in the Arctic, and in crocodile eggs in remote regions in Kenya.

4. *Pesticides can remain in the environment for a very long time.*
   TRUE. Most pesticides are synthetic organic compounds and can accumulate and persist for a long time. Some pesticides may remain dangerous for up to 20 years.

5. *Once pesticides break down they become less of a health hazard.*
   FALSE. Some pesticides break down into even more hazardous materials.

6. *If a pesticide is sold in a nursery, it is safe to use.*
   FALSE. The EPA has stated that no pesticide can claim to be safe since they are designed to be biologically active and kill a variety of organisms. Pesticides can be registered by the EPA even when studies show that they pose risks to human or environmental health. Pesticides are not tested for the effects they have on the immune, neurological or endocrine systems, and pesticides are not required to list "inert" materials that can sometimes be more toxic than the active ingredients.

7. *Many insects have become resistant to pesticides in recent years.*
   TRUE. Many organisms have become resistant to pesticides. Resistant insects that survive pesticides pass on their resistant genes to the next generations. Widespread use of chemical pesticides began in the 1950s, and by 1984 there were over 500 resistant insect species. Over 270 weed species, 150 plant diseases, and several species of rodents are also resistant to one or more pesticides.

8. *Chemical controls of pests cost less than biological controls.*
   FALSE. Biological controls are less expensive over time because they provide more permanence than chemical controls. Once a natural enemy of a pest is established in the garden, no further care is needed. Chemicals that need to be reapplied are costly, especially when one considers the health and environmental risks.

9. *Organic gardening methods are not effective at reducing garden pests.*
   FALSE. Organic gardening techniques are designed to promote a healthy, balanced ecosystem that creates strong plants and attracts beneficial insects, thus reducing the need for pesticides. Organic gardening practices include composting, mulching, companion planting, and Integrated Pest Management.

10. *A mixture of different plants growing together can resist insect infestations better than a large area of one species of plant.*
    TRUE. Certain plants actually help each other to survive. Many plants repel bugs and provide natural protection if they are planted beside susceptible plants. Some plants help to feed their neighbors and keep them from becoming susceptible to pests by making trace elements easily available to their roots. By planting a diverse garden you will create a balanced ecosystem that provides habitat for beneficial insects, birds, and other wildlife that control insect pests.

11. *Pesticides are not harmful to people.*
    FALSE. Many pesticides are toxic to humans and can have long-term health effects such as cancer, genetic mutations, or birth defects. A 1984 study by the National Academy of Science found that 90 percent of all pesticides have never been tested for long-term health effects. Every year up to two million people suffer from pesticide poisoning worldwide. A National Cancer Institute study found that children are six times more likely to get childhood leukemia when pesticides are used in the home and garden.

12. *The proper way to dispose of unwanted pesticides is to pour them down the sink or toilet.*

    FALSE. Garden and yard chemicals poured down household drains cannot be removed at the sewage treatment plant and enter our waterways *untreated*. California law forbids disposal of any unused pesticides in home garbage. These chemicals need to be taken to a hazardous waste collection facility. Call the County Household Hazardous Waste Program for information on disposal sites and pickup schedules. See Section 10 for phone numbers and contacts.

13. *Pesticides are not used on school sites.*

    FALSE. Many schools routinely spray pesticides on school grounds and in classrooms to kill insects, weeds, rodents, molds, and mildew. These pesticides can cause learning disabilities, behavior changes, and damage to the nervous and endocrine systems. A recent report by the National Academy of Sciences states that children are more susceptible than adults to the health effects from low-level exposures to pesticides over the long term.

Friend, Foe, or Escargot?

Summary
Students learn to identify pests and beneficial organisms in the garden, and they learn how Integrated Pest Management techniques can help keep a garden healthy without the use of chemical pest controls.

Grades:	• K–8
Time:	• 1 hour
Materials:	• pencils and paper or garden journals • samples of leaves with pest damage from the garden • Garden Friends and Garden Foes identification sheets, one for each student or each team of students • Garden Friends and Garden Foes Background Information, one for each student or each team of students • garden reference books with information on garden pests and beneficial insects (see the bibliography for suggestions)
Setting:	• classroom and garden beds or outdoor containers

"Assassin bugs in your lettuce patch? Rejoice!"
—Allison Mia Starcher

Background
A garden is a complex ecosystem teeming with life. While a few of the animals and insects that live in a garden can cause damage to the plants, most of the creatures we find in the garden are essential to the health of the plants.

Insects are the most common creatures we see in the garden, and very few of them are pests. It is estimated that of the nearly one million insect species we have identified, less than 1 percent are pests. Insects have been on earth for over 400 million years and play an important role in the garden. Many insects are pollinators that are essential for the production of fruit, vegetables, and flowers. Some insects are parasites or predators that prey on garden pests. Insects are an essential link in many food chains, providing food for other insects, birds, and animals. Many insects provide us with foods and household materials like silk, honey, and wax.

Insects are not the only important creatures that live in the garden. Spiders, members of the arachnid family, provide an important biological control as they catch and eat a variety of garden pests. They differ from insects in the amount of body segments (2) and legs (8). Spiders live all over the globe, and in one acre of land there may be as many as 50,000 spiders! Earthworms are also essential to the health of garden soil. They digest organic matter and excrete it in castings that provide important nutrients to plants. Earthworms also help improve the texture of soil as they tunnel through the ground. Other animals, like birds, bats, snakes, lizards, toads, frogs, and salamanders eat large numbers of insect pests.

Being able to identify the insects and animals living in a garden and understanding the predator-prey relationships between these organisms is essential in developing a safe plan to control or manage pests. Using chemical pesticides at the first sign of pest damage can often cause more problems than it solves. Pesticides do not target a specific pest—they also kill the beneficial organisms in a garden. By killing off beneficial insects, insects that were never a problem may now become a pest. What's more, pests can become resistant to these chemicals and can pass their resistance on to new generations. Pesticides are designed to kill biological organisms, so they pose a health risk to people and pets as well. Toxic chemicals used in a garden can remain active in the soil for many years, and they can wash into our storm drain system where they enter our creeks and Bay and harm aquatic life. Disposing of these chemicals is also a problem—pesticides poured down household drains are not removed at the sewage treatment plant and can enter our waterways untreated.

In an Integrated Pest Management (IPM) program, the goal is not to wipe out all garden pests, but to keep these populations at low levels so that the amount of damage to garden plants is acceptable. Keeping some pests in the garden ensures that you will also have a healthy population of the beneficial insects that prey on them. In this activity, students learn about Integrated Pest Management techniques as they inventory the animals and insects that live in the garden, identify the roles these creatures play in the garden ecosystem, and monitor the garden for damage done by pests.

Activity

1. Ask students to draw pictures and create a list of the insects and animals they have seen in the garden. What were these creatures doing? What do they eat? What other creatures might live in the garden?
2. Have students determine which of the creatures on their list might be considered a pest. What is a pest? What are some pests around your home and garden? Is a pest always harmful? Ask students if any of them have mice, rats, snakes, or rabbits as pets. Some people consider these animals to be pests while others consider them pets. Some insects may be pests in one stage of their life cycle while they are beneficial in another stage. (For example the tomato hornworm eats the leaves on tomato plants, but the adult moth acts as a pollinator.)
3. Ask students if they can always tell if an insect or animal is a pest just by the way it looks. Some larval forms of beneficial insects look like hideous

monsters, but they can eat huge numbers of garden pests. Some people think spiders and bats are scary, but they are important controls of insect pests.

4. Hold up some examples of leaves that show insect damage. Ask students if they can identify the pest that caused the damage. Can you tell if it was a sucking or chewing pest? How can you find out which pest caused the damage? Why might it be important to know exactly which insect or animal was the pest?
5. Explain to students that they will be exploring the garden to create an inventory of the insects and animals they find living there. Divide the students into teams or pairs and give each team Garden Friends and Garden Foes identification sheets and paper and pencils to sketch and record their finds. (You might want to have them record their work in their garden journals.) Have students explore the garden to locate as many creatures as they can. Look for signs of insect damage and evidence that animals have been visiting the garden (chewed leaves, feathers, old spider webs, tracks).
6. Have each team share its results with the rest of the class and create a class list of the creatures you found living in the garden. Which of these creatures are considered pests, and which are considered beneficial?
7. Now that students have identified both pests and beneficial organisms, ask them what techniques they might use to control the pests they found and list their ideas on the board. Which ideas target the specific pest? Which ideas might have an impact on beneficial insects or human health? How can you use the relationships between pests and beneficials to keep the garden healthy?

To solve pest problems in the garden, students need to become pest detectives—they need to use their observation skills to search for clues leading them to the real pest, and they need to develop strategies that allow them to catch the culprit without causing harm to themselves or the environment. Introduce and discuss the techniques used in an Integrated Pest Management approach:

- *Plan the garden carefully.* Choose plants adapted to your climate and area, and choose species that are least prone to damage. Planting a diverse mix of vegetables and flowers will help maintain a balance of pests and predators. Choose "companion" plants that help to repel pests, and rotate crops each year.
- *Keep plants healthy.* Strong plants are less susceptible to pest damage, so be sure to give your plants the water, light, and nutrients they need to keep from being stressed and weak.
- *Identify the specific pest.* Be sure you know which pest is actually causing the damage and learn about its life cycle and its predators.
- *Accept a certain amount of damage.* Don't assume a pest will become a problem. Some amount of damage should be acceptable—wait to see if the amount of damage becomes a real problem.
- *Start with the least-toxic or intrusive controls.* Some methods of control include hand-picking pests, protecting plants with barriers like floating row covers or collars, setting out traps, introducing beneficial insects or pathogens, and mixing up liquid soap and water to spray the plants.

8. Have each team of students choose one of the animals or insects they found in the garden to research. They can use the background information included with this activity, garden reference books, and the Internet to find out more about their insect or animal. Is it harmful or beneficial? What is its role in the garden ecosystem? What types of adaptations allow it to survive in the garden habitat? What is its life cycle? If it is a pest, what types of nontoxic controls can be used to control it? If it is a beneficial organism, what pest does it help to control? Have students share their findings with the class.

Discussion

- What insect or animal was the most numerous in your garden? Why would this organism be so numerous?
- Where did you find the most organisms in the garden? What type of habitat did they seem to prefer?
- Did you find more garden friends or garden foes? Why?
- Did you find evidence of insect damage on the garden plants? What kind of evidence? Could you identify the pest that was feeding on the plants? Is it always easy to determine what has been eating your plants?
- What would happen if there were no insects living in your garden? What would life be like if there were no insects alive on earth?
- How much do people's attitudes towards insects and animals play a part in the type of controls they use in the garden? Would you be willing to eat an apple that has insect damage or an apple that had a worm hole?

Branching Out

- Create a flyer or brochure with a sketch and brief description of the most common beneficial insects in the garden and why they are important. Be sure to include a description of Integrated Pest Management techniques. Take copies of the flyer home and distribute them at local garden centers and libraries.
- Use your survey of the creatures you found living in the garden to play the web of life game included in this section of the binder.
- Create a garden habitat mural. Include both garden friends and garden foes and show where they might be found in the garden. Use string to show connections between predators and prey.
- There are many plants that attract beneficial insects. For example, goldenrod has been found to attract more than 75 species of beneficials! Research these plants and include them in your garden. See the "Pest Patrol: Planting a Beneficial Insect Garden" activity in the "Planning and Planting Theme Gardens" section of this binder.
- Choose one organism you found in the garden and write a story about its life from that animal's or insect's point of view. What is your life like in the garden? What do you eat? How do you find your food? What are the dangers of living in the garden?
- Set up an experiment to determine the food preferences of garden pests. Collect several different leaf samples of approximately the same size from the

garden and place them in a large jar or petri dish. Introduce a pest from the garden and observe it for 24 hours to determine which food it prefers. (Be sure the insect is kept out of direct sunlight and has an adequate air supply.) Repeat this experiment with different insects. Can this information help you plan a pest management program in your garden?

- Do some research on what your garden site was like 200 years ago. What plants and animals might have been living there? Would pests have been a problem?

APPENDIX VII

Pest Management Surveys

Pest Management Practices Survey for School Grounds

This survey is designed to gain information about the pest management practices used in the schoolyard garden and landscaping areas. Please provide the students with as accurate information as possible.

Name(s)_____

School _____ Date_____

SECTION 1: GARDENING PRACTICES

Please answer the following questions about the garden at your school grounds.

1. Does the school have a garden?

❑ Yes ❑ No *(If "no," go to Section 2: Landscaping)*

2. What type of garden(s) is it (i.e., vegetable, flower, native plant)?

_____

3. How is soil fertility maintained? *(Check all that apply.)*

❑ Chemical fertilizers: Which products are used? _____

What signal words appear on the label(s):

Product: _____

Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

Product: _____

Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

How often are they used? _____

❑ Organic fertilizers : Which products are used? _____

_____

What signal words appear on the label(s):

Product: _____

Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

Product: _____

Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

How often are they used? _____

❑ Compost: How often? _____

❑ Other *(please specify)*: _____

4. How are weeds controlled? *(Check all that apply.)*

❑ Pulling by hand

❑ Herbicides: Which products are used?_____

What signal words appear on the label(s):

Product: _____
Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

Product: _____
Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

How often are they used? _____

❑ Mulching: What materials do you use?_____

❑ Other *(please specify)*:_____

5. How are pests controlled? *(Check all that apply.)*

❑ Biological Control (encouraging beneficial insects)

Explain what you have done: _____

❑ Insecticides: Which products are used?_____

What signal words appear on the label(s):

Product: _____
Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

Product: _____
Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

How often are they used? _____

❑ Other methods *(please explain)*: _____

6. What method is used to water the garden?

❑ Drip irrigation ❑ Hand watering
❑ Sprinklers ❑ Other (please specify): _____

7. How often, and for how long, is the garden watered?

_____

❑ This is a regular schedule that occurs year round.
❑ The watering schedule varies with season and growth.

8. What method is used to dispose of green waste from the garden?

❑ Compost ❑ Dumpster/Green waste bin

❑ Other *(please specify)*: _____

SECTION 2: LANDSCAPING

Please answer the following questions about the landscaping on the school grounds, including lawns, flower beds, and other landscaping.

A. Lawn Care

9. How often is the lawn mowed?_____

❑ This is a regular schedule that occurs year round.

❑ The mowing schedule varies with season and growth.

10. What type of lawn mower is used?

❑ Gasoline powered ❑ Electric powered

❑ Hand mower ❑ Other: _____

11. How often, and for how long, is the lawn watered?

_____

❑ This is a regular schedule that occurs year round.

❑ The watering schedule varies with season and growth.

12. How often are the lawns fertilized?_____

❑ This is a regular schedule that occurs year round.

❑ The fertilizing schedule varies with season and growth.

13. What type of fertilizer is used on the lawns? *(Check all that apply)*

❑ Chemical fertilizers: Which products are used?_____

What signal words appear on the label(s):

Product: _____

Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

Product: _____

Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

How often are they used? _____

❑ Organic fertilizers: Which products are used?_____

_____

What signal words appear on the label(s):

Product: _____

Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

Product: _____

Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

How often are they used? _____

❑ Compost: How often? _____
❑ Other *(please specify)*: _____

14. How does your school dispose of the grass clippings? *(Check all that apply)*
❑ Compost ❑ Left on the ground (Mulching mower)
❑ Dumpster ❑ Other *(please specify)*: _____

B. Other Landscaped Areas

15. What method is used to water other landscaped areas at the school?
❑ Drip irrigation ❑ Hand watering
❑ Sprinklers ❑ Other *(please specify)*: _____

16. How is soil fertility maintained? *(Check all that apply)*
❑ Chemical fertilizers: Which products are used? _____
What signal words appear on the label(s):

Product: _____
Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

Product: _____
Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

How often are they used? _____

❑ Organic fertilizers : Which products are used? _____
_____

What signal words appear on the label(s):

Product: _____
Signal word: ❑ Danger ❑ Caution ❑ Warning

Product: _____
Signal word: ❑ Danger ❑ Caution ❑ Warning

How often are they used? _____

❑ Compost: How often? _____

❑ Other *(please specify)*: _____

17. How are weeds controlled? *(Check all that apply)*
❑ Pulling by hand

❑ Herbicides: Which products are used?_____

What signal words appear on the label(s):

Product: _____
Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

Product: _____
Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

How often are they used? _____

❑ Mulching: What materials do you use?_____

❑ Other *(please specify)*:_____

18. How are pests controlled? *(Check all that apply.)*
❑ Biological Control (encouraging beneficial insects)

Explain what you have done _____

❑ Insecticides: Which products are used?_____

What signal words appear on the label(s):

Product: _____
Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

Product: _____
Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

How often are they used? _____

❑ Other methods *(please explain)*: _____

SECTION 3: COMPOSTING

Please answer the following questions about the composting program at your school.

19. Does your school have a composting program?
❑ Yes ❑ No *(If "no," skip the remaining questions)*

20. What do you compost? *(Check all that apply)*
❑ Waste from the garden ❑ Waste from the cafeteria
❑ Yard waste (grass clippings, leaves, trimmings)

21. How do you utilize your compost? *(Check all that apply)*
❑ Soil amendment on the school grounds
❑ Mulch on the school grounds
❑ Ends up in a landfill

❑ Sell it. To whom?:_____

_____

❑ Give it away. To whom?:_____

❑ Other *(please specify)*_____

Thank you for taking the time to answer these questions!

Home Pest Management Practices Survey

This survey is designed to gain information about the pest management practices used in the home gardens and yards. Please provide the students with as accurate information as possible.

Name(s)_____

School _____

Date_____

SECTION 1: GARDENING PRACTICES

Please answer the following questions about the garden at your house.

1. Does your home have a garden?

❑ Yes ❑ No *(If "no," go to Section 2: Lawn Care)*

2. What type of garden(s) is it (i.e., vegetable, flower, native plant)?

_____

3. How is soil fertility maintained? *(Check all that apply)*

❑ Chemical fertilizers: Which products are used? _____

What signal words appear on the label(s):

Product: _____

Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

Product: _____

Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

How often are they used? _____

❑ Organic fertilizers : Which products are used? _____

_____

What signal words appear on the label(s):

Product: _____

Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

Product: _____

Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

How often are they used? _____

❑ Compost: How often? _____

❑ Other *(please specify)*: _____

4. How are weeds controlled? *(Check all that apply)*

❑ Pulling by hand

❑ Herbicides: Which products are used?_____

What signal words appear on the label(s):

Product: _____
Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

Product: _____
Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

How often are they used? _____

❑ Mulching: What materials do you use?_____

❑ Other *(please specify)*:_____

5. How are pests controlled? *(Check all that apply.)*

❑ Biological Control (encouraging beneficial insects)

Explain what you have done _____

❑ Insecticides: Which products are used?_____

What signal words appear on the label(s):

Product: _____
Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

Product: _____
Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

How often are they used? _____

❑ Other methods *(please explain)*: _____

6. What method is used to dispose of green waste from the garden?

❑ Compost ❑ Dumpster/Green waste bin
❑ Other *(please specify)*: _____

7. What method is used to water the garden (i.e., drip irrigation, sprinklers)?

❑ Drip irrigation ❑ Hand watering
❑ Sprinklers ❑ Other *(please specify)*: _____

8. How often, and for how long, is the garden watered?

_____

❑ This is a regular schedule that occurs year round.
❑ The watering schedule varies with season and growth.

SECTION 2: LAWN CARE

Please answer the following questions about the lawn areas.

9. Does your home have a lawn?

❑ Yes ❑ No *(If "no," go to Section 3:Composting)*

10. How often is the lawn mowed?

_____

❑ This is a regular schedule that occurs year round.
❑ The mowing schedule varies with season and growth.

11. What type of lawn mower is used?

❑ Gasoline powered ❑ Electric powered
❑ Hand mower ❑ Other: _____

12. How often, and for how long, is the lawn watered?

_____

❑ This is a regular schedule that occurs year round.
❑ The watering schedule varies with season and growth.

13. How do you dispose of the grass clippings? *(Check all that apply)*

❑ Compost ❑ Left on the ground (Mulching mower)
❑ Dumpster ❑ Other *(please specify)*: _____

14. How often is the lawn fertilized?

_____

❑ This is a regular schedule that occurs year round.
❑ The fertilizing schedule varies with season and growth.

15. What type of fertilizer is used on the lawns? *(Check all that apply)*

❑ Chemical fertilizers: Which products are used?_____

What signal words appear on the label(s):

Product: _____
Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

Product: _____
Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

How often are they used? _____

❑ Organic fertilizers: Which products are used?_____
_____

What signal words appear on the label(s):

Product: _____
Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

Product: _____
Signal word: ❑ Danger ❑ Caution ❑ Warning ❑ Poison

How often are they used? _____

❑ Compost: How often? _____

❑ Other *(please specify)*: _____

SECTION 3: COMPOSTING

Please answer the following questions about the composting you do at home.

16. Do you compost?

❑ Yes ❑ No *(If "no," skip the remaining questions)*

17. What do you compost? *(Check all that apply)*

❑ Waste from the garden ❑ Waste from the kitchen
❑ Yard waste (grass clippings, leaves, trimmings)

18. How do you utilize your compost? *(Check all that apply)*

❑ Soil amendment ❑ Mulch
❑ Ends up in a landfill ❑ Give it away. To whom?:_____

❑ Other *(please specify)*:_____

APPENDIX VIII

Stipend Project Summaries

and

Outreach Materials

Alameda County *Kids in Gardens*, Summer 2000
Summary of Action Projects

Number of students who took surveys: 171
Number of parents and community members who received outreach materials: 3,057

Laura Arnow, Manzanita Elementary, Pleasanton, Grade 1

- Teacher designed a lesson to help very young students identify toxins in the home.
- Students actively learned the "Yuk" level of products found in their homes (e.g. Caution, Warning, Danger and Poison).
- Applied for grant monies to fund the purchase and construction of raised planting beds for schoolyard gardens.
- Using Sausal Creek to teach the students about watershed awareness issues.

Cherie Barnecut, Kitayama Elementary, Union City, Grade 3

- Development of an informational brochure designed to educate the public on the dangers of using pesticides.
- Plans to distribute educational brochures to the entire student body, families, community members, City Hall, libraries and local nurseries.
- Using 7 newly established raised planting beds for promotion of a safe gardening practices curriculum.
- Using 25 worm bins for classroom demonstration and education.
- Practicing vermi-composting on site.
- Students conducted the Home Pest Management survey.

Dianne Driscoll, Windrush School, El Ceritto, Grade 3

- Collected seed from local native plant gardens.
- Planted a garden with an emphasis on native plants and their attributes.
- Plan to name and label native plants in both their butterfly and native plants gardens.
- Growing native oaks and buckeyes to outplant in a local creek restoration project.
- Students took the Pesticide Poll, learning the lessons of lawn and garden chemicals.

Karen Lance, Kitayama Elementary, Union City, Grade 3

- Students kept a journal with garden, insect, soil and general organizational observations.
- Conducted an insect survey at school and at home, with discussion of "good" and "bad" types of insects.
- Learned the effects of pesticides on the food chain and that they are used at home commonly.
- Class creation of an educational pamphlet discussing ways in which to avoid using pesticides. Planning to distribute to the school community and local businesses.
- Participated in the Home Pest Management Practices survey.

Janan Apaydin, Kaiser Elementary, Oakland, Grade 2

- Creation of a worm composting booklet to be made available to parents and the school.

- Students and teachers learned to compost in a stacking bin and a worm composter.
- Utilized KIG binder activities (e.g. earth apple, drop in a bucket, etc,) to teach the kids gardening lessons.
- Conducted the pesticide label lesson, "YUK" to help students learn the danger levels of chemicals in the home, as well as the Home Pest Management survey.

Kathy Frye, Kitayama Elementary, Union City, Grade 3

- Students designed a pamphlet to inform the community of the alternatives to pesticide use against harmful insects. This pamphlet named "Bug Invasion" will be sent to student body, local businesses and libraries.
- Journals on garden observations were kept.
- Soil preparation and initial planting of the school garden was undertaken.
- Investigation of friend and foe insects was done by the kids.
- Home Pest Management Practices survey was taken by students.

Kathryn Peters, Walnut Grove Elementary, Pleasanton, Grades K and 1

- Students were engaged in all aspects of composting. They were briefed and introduced to worms, their anatomy, how they function in composting, the creation of worm bins and introducing to and observing worms in a garden environment.
- Certificates of achievement were awarded to every student for outstanding effort in their worm project.
- Students conducted pollution surveys with their parents.

Santa Clara County Kids in Gardens
Summary of Action Projects

Number of students who participated in action projects	242
Number of parents and community members who received outreach materials	2,396

Amy Andress, Hacienda Science Magnet, San Jose, Grade 4

- Students prepared a raised garden bed with school-made compost.
- Planted onions and garlic to donate to the San Jose Food Bank.
- Three surveys were sent home and conducted with parents: a water survey, a toxics survey, and a pest management practices survey.
- Writing a column on the food bank project and nontoxic gardening practices for the school newsletter.

April Carlson, Bertha Taylor Elementary School, San Jose, Grades 4-6

- Students collaborated with a local Girl Scout Troop to design and build a wheelchair accessible planting structure.
- Students started seedlings indoors to be transplanted outside.
- Maintained worm bin with waste from school cafeteria lunches.
- Worm castings used in garden bed.
- Students conducted pest management survey with parents.
- Colored and distributed 40 brochures on nonpoint source pollution prevention to parents and other classrooms.
- Planning science fair project "Water as a Valuable Resource."
- Planning doorhanger project with another classroom.
- Planning a California native water garden.

Marilyn Charell, Silver Oak Elementary, San Jose, Grade 3

- Students and parent volunteers planted California natives and other plants in the garden.
- Students conducted pest management survey with parents.
- Discussed importance of water and how water becomes polluted through human impacts.
- Created a flyer about water quality protection for the back page of the school newsletter.

Ann Marquino and Deborah Epperson, Hacienda Science Magnet, San Jose, Grades 3-5

- Students and parent volunteers conducted native plant restoration project in the school garden. Removed invasive exotics and planted native plants.
- Consulted with California Native Plant Society and UC Berkeley Botanical Garden
- Educated parents about the value of native plants.
- Students conducted pest management survey with parents and with school grounds keeper.
- Taught students about Integrated Pest Management and protecting the quality of water and air.
- Will offer tours of the school's extensive California native plant garden at the Spring Open House.

Beth Mabie, Kelley Park School, San Jose, Grades 5/6

- Presented lessons on watershed protection to students.
- Propagated plants with students.
- Students conducted pest management survey with parents.
- Sent flyers about least toxic pest control techniques and coffee can composting home to parents.

Danielle Petrell, Oster School Girl Scout Troop, San Jose, Grades 3/4

- Studied runoff pollution through interactive exercises.
- Students conducted pest management survey with parents.
- Created booklet "Friendly Ways to Get Rid of Bugs." Colored doorhangers and attached booklet to doorhangers.
- Distributed doorhangers to neighborhood.

Kids in Gardens **Fall 2000**
Napa/Solano County

Summary of Action Projects

Number of students who participated in these projects: 243
Number of parents and community members who received outreach materials: 1,160

Jeane Beno, Laurel Creek Elementary, Fairfield, Grades K-1

- Watershed curriculum: Students learned to read labels for signal words, and participated in activities such as Earth as an Apple and Perilous Poisons.
- Students maintained a vermicomposting bin.
- Two raised beds were planted with seeds for the Eclectic Garden.
- All first and second grade students in the school colored doorhangers with information on proper use and disposal of hazardous household materials and distributed them to 360 community members.
- Held an Earth Day Garden Clean-up with parents.
- Students conducted pest management surveys with parents and the school district pest management specialist.

Lorraine Emberley, West Park Elementary, Napa, Grade 3

- Students worked with a Napa County Master Gardener to prepare and plant the spring garden.
- Third grade classes received intensive instruction about worms from the California Native Plant Society's 4-part Ecology Program and began vermicomposting projects.
- Students learned to make "informed" decisions about purchasing and using hazardous household products through the pest management surveys they completed with their parents and then discussed in class.
- Third graders are also piloting the River Systems Program which educates about the Napa River watershed.

Kathy Gray, Laurel Creek Elementary, Grade 2

- Students planted vegetable, butterfly, and beneficial insect gardens.
- Held an Earth Day clean up to prevent maintenance personnel from spraying Round-up on weeds in the garden.
- Colored and distributed doorhangers about pollution prevention to 360 community members.

Sylvia Hefley, St. Apollinaris School, Napa, Grade K

- Students learned about ladybeetles as beneficial insects, painted ladybug rocks, made ladybug folders for the pest management surveys, and distributed 3,000 live ladybeetles in the garden to get rid of pests.
- Planted a wildflower garden and transplanted flowers.
- Took pest management surveys home and conducted them with their parents.

Brenda Irwin, Napa Children's Center, Napa, Grade Preschool

- Mulched the garden with dried fall leaves.
- Started a vermicomposting project.
- Pest management surveys were sent out to preschool teachers at different centers.
- Parents from the center and the Napa Sunrise Rotary Center built two raised beds for the garden and Napa Valley Disposal provided 6 yards of top soil for the garden.

Anita Johnson, Browns Valley Elementary, Vacaville, Grade 4

- Planted herbs, vegetables, and a hummingbird garden.
- Started a compost pile.
- Students completed pest management surveys with their parents.
- Studied pollution prevention in the classroom, including a visit from Mary Nen-King from the regional water department.
- Colored and distributed 100 doorhangers on pollution prevention to the community.

Cheryl Jones, St. Apollinaris School, Napa, Grade 1

- Students toured the school grounds looking for sources of pollution and discussed pollution prevention in the classroom.
- Students conducted pest management surveys with their parents.

Carol Kreisman and Janice Larison, Community United Methodist Church School, Fairfield, Grade K

- Planted flower seeds with compost in containers.
- Released ladybugs as pest protection for school rose bushes.
- Displayed student made posters about ladybugs and worms for Earth Day.
- Students made and sent home self-made books focusing on ladybug and worm features.
- Took the Home Pest Management Practice survey with their parents.

Shelley Reynolds, Irene Snow Elementary, Napa, Grades K and 1

- Planted a strawberry patch outside the K and first grade classroom.
- Students and teachers started a vegetable garden for the school.
- Sent home "ecology packets" including information on composting, "good" and "bad" insects, and less toxic pest control methods.
- Parents filled out pest surveys with students.
- Printed, colored, and distributed door hangers encouraging watershed protection.
- Planning to present topics related to pesticide use and watershed awareness at school open house.

Mary Ann Terrell, John Davidson Elementary, Vallejo, Grades 2 and 3

- Students planted a vegetable garden and a flower garden using seeds and nursery starter plants.
- Discovered that run-off from pesticides ends up in the Bay.
- Learned about the dangers of pesticides and alternative methods to controlling pests.
- Students made doorhangers about fish and run-off water to the Bay.
- Took pest management practices survey with their parents.

Earth Day...April 22

Dear Families,

On Friday, April 20, our first and second-graders plan to walk the neighborhood around Laurel Creek School on an Earth Day action project. We have been coloring door hangers to pass out to the homes. These have a message to raise awareness of how we can protect our creeks, rivers, and bay from pollution.

We will be walking with the students from about 1:40PM to 2:50PM that Friday. Please sign and return the permission slip for your child to participate by Wednesday, April 18th.

If you can join us and help chaperone please return the bottom of this, too. We'll meet in our classrooms at 1:30 on Friday, April 20. Thanks so much!

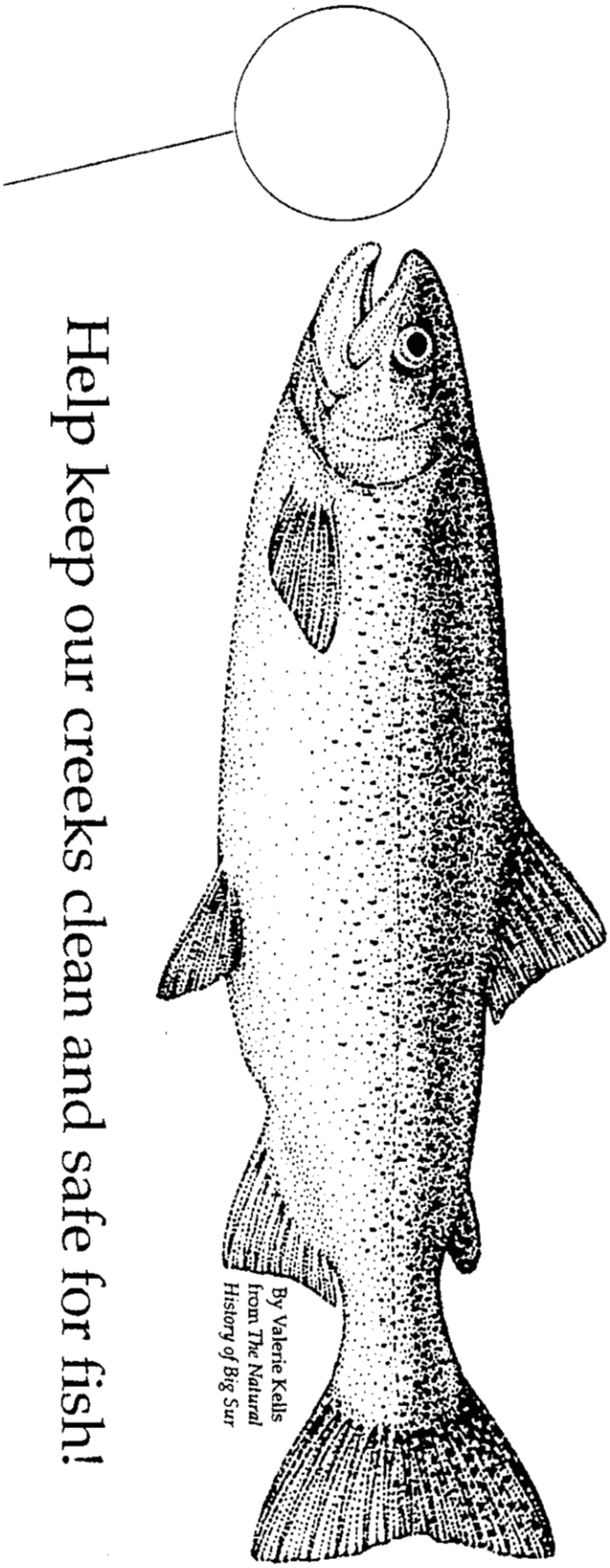
Mrs. Beno and Mrs. Gray

* * * * * * * * * cut here and return * * * * * * * * * * * * * *

Yes, I will be able to join the class to help on April 20.

name_____ phone_____ child_____

Help keep our creeks clean and safe for fish!



Steelhead Trout

This trout was colored by

_____

The students at Laurel Creek **school want to ask if you know:**

- that motor oil, car wash detergent, paints, and thinners dumped into storm drains flow directly into nearby creeks, the Bay, and the Ocean? Please don't dump!

- that pesticides, herbicides, and fertilizers from your yard often end up in creeks, making the water unsafe for fish? Because these chemicals contribute to urban runoff pollution, use them sparingly, and not when rain is forecast.

Call (800) CLEAN-UP to find out how to properly dispose of these hazardous materials.

Thanks!

1st and 2nd grade classes!

Laurel Creek Garden Cleanup!

Saturday, April 21....8:30-10:00 AM

Tuesday, April 17, 2001

Dear Families,

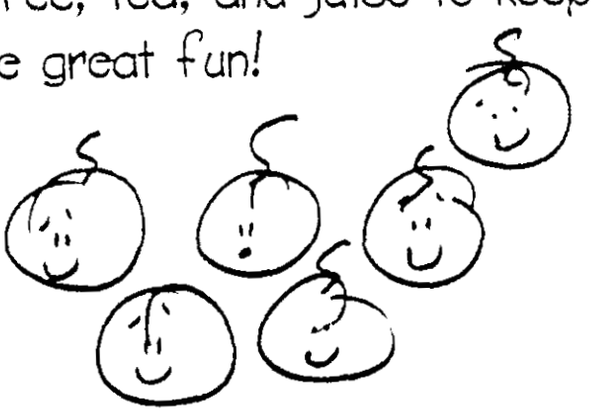
Please join us for a short Earth Day action project at the Life Lab garden at Laurel Creek School next Saturday morning from 8:30-10:00.

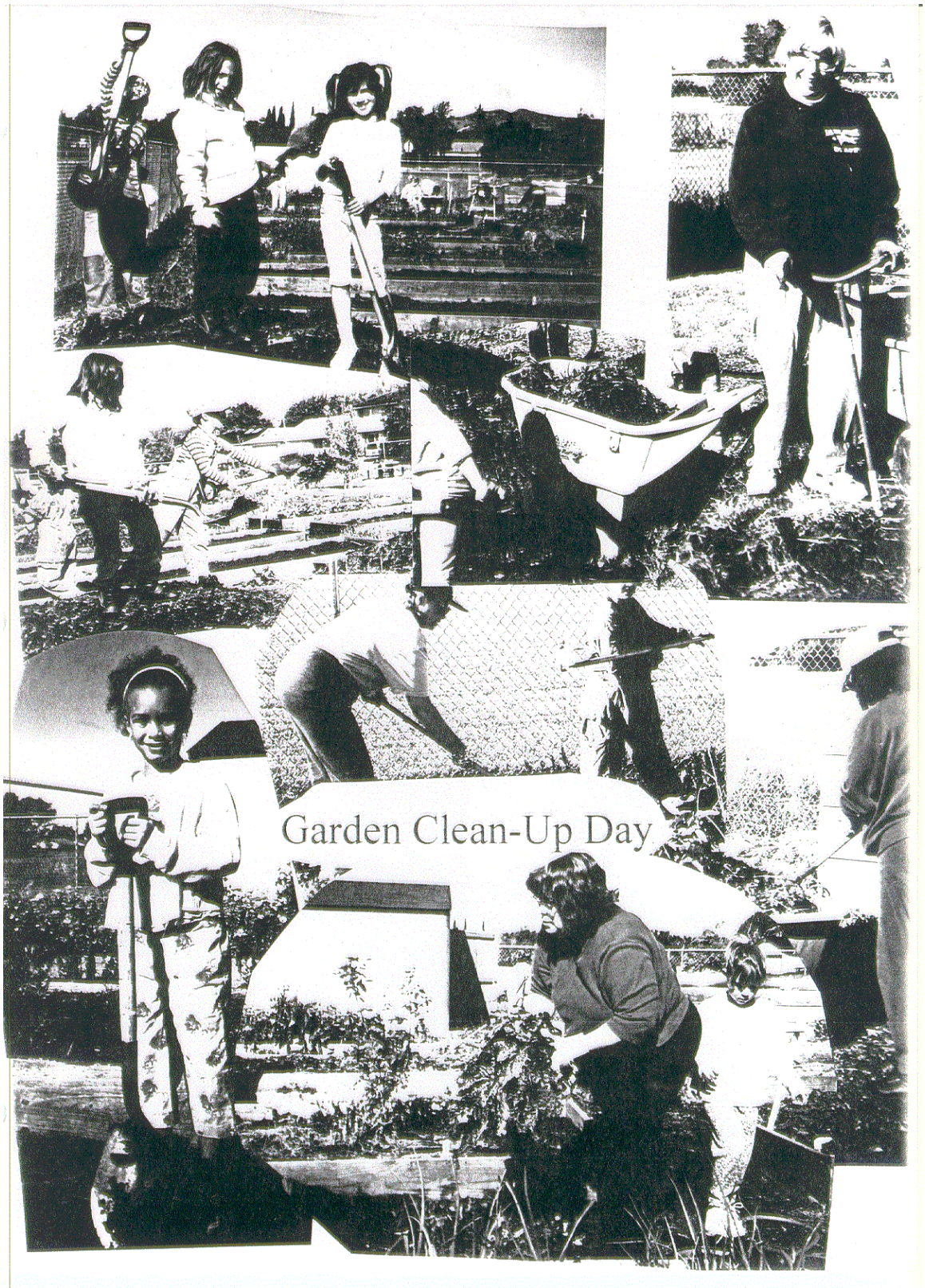
Children must have an adult along to help. Several things need to be done...weeding garden pathways, then spreading bark, repairing or removing trim boards, turning some of the planting beds. Bring your gloves, favorite tools (we have quite a few, but not enough for a big turnout), and a cheerful spirit!

There will be rolls, coffee, tea, and juice to keep your energy up. It should be great fun!

See you then!

Mrs. Greg
Ms. Beno
and all




Garden Clean-Up Day

APPENDIX IX

WOW Newsletter

AQUATIC OUTREACH INSTITUTE'S

Summer 2001

Watching Our Watersheds News

For Kids in Creeks, Kids in Marshes, Kids in Gardens, Watching Our Watersheds and Habitat Stewards Alumni

Habitat Helpers:

Attracting Beneficial Insects to Your Garden with Coastal Native Plants

by Tony Reiber, San Francisco League of Urban Gardeners

Evolution of species (plant, animal and microorganisms) is a main factor in the health of your garden. For instance, plants and insects, for thousands of years, have co-existed and developed to complement each other. In coastal California, this intricate evolutionary development exists in natural landscapes – even in the remnants of open spaces in San Francisco, but rarely in home gardens. The benefits to harboring this natural phenomenon will provide a garden with a sustainable pest control method. California native plants weather scrub, grassland or wetland habitats and live in harmony with predator insects that enjoy dining on your garden pests.

1. Follow nature's lead

In a natural setting, plants, animals and microorganisms are balanced, not allowing any single species to dominate and thus reduces the amount of pest occurrences. Mimicking the native habitat in your garden plot or backyard provides a more diverse habitat. Observe the plants and insects that can be found at open space local parks. Many of these species can be found at local nurseries which specialize in the propagation of native plants.

(continued on page 14)

Students Restore Frog Habitat

by Johanna Brandriff, Prospect Sierra School, El Cerrito

Not long ago, when I was a kid, I could go to almost any local pond or stream to find and collect tadpoles. I would watch in amazement as these tiny beings sprouted legs and lost their tails in the wondrous transition into hopping adults. Today, opportunities to watch nature first hand are limited because so much of our native landscape has been paved over. Recently at Prospect Sierra, in El Cerrito, we initiated two restoration projects that have provided our students with a golden opportunity to take part in the restoration of local habitat, allowing our kids to regain the wonder of witnessing the natural history of frogs.

Kindergarten teacher Kathryn Lee began the first of these projects four years ago. Kathy discovered that the pond by the Tapscott elementary school campus was once the home of many Pacific chorus frogs. Over the years fewer and fewer of these small green and brown frogs returned there in the winter to spawn. Kathy resolved to restore the habitat and see the return of the frogs, and she envisioned important and valuable lessons for her students in the process. To help return the pond to its natural state, she and her students removed all the non-native plants that surrounded it.

(continued on page 15)

Upcoming Summer & Fall Workshops!

- **NEW:** *Habitat Stewards* (Alameda County) for educators and the general public in August.
- **FULL:** *Kids in Gardens* (Alameda County) on September 29 & October 6, 2001 in Oakland.
- **NEW:** *Watching Our Watersheds for Grades 6-12* offered in
  - Contra Costa County on September 29 and October 13, 2001 in Oakley and Pittsburg.
  - Santa Clara County on October 20 & 27, 2001 in San Jose.
  - Alameda County on November 3 & 10, 2001—location TBA.

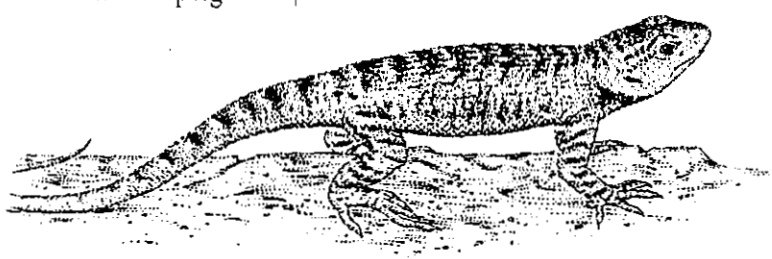
For more information about these workshops, please see page 5, or call the Aquatic Outreach Institute at (510) 231-5783 for *Watching Our Watersheds*, 231-5784 for *Habitat Stewards* and 231-9493 *Kids in Gardens*.

Free Teaching Materials

Remember those beautiful brochures you get when you visit a National Park? They're always full of great pictures and helpful information! Well, whenever there is a minor detail to change (like an area code), the Government Printing Office prints a new edition. So what do they do with all the old ones? Check this out! The National Park staff (special thanks to Sheila Braden) thought like a teacher. They developed age appropriate educational worksheets on biology, geology, history, and they will send them to you, along with a classroom set of appropriate brochures! Your students can study many aspects of environmental education, thanks to our National Parks, while still in the classroom!

Want a free set? Call or email Annette East (805-370-2348, annette_east@nps.gov) and let her know your grade level, the number of students, and what area of study you are emphasizing. She'll get a classroom set right out to you!

Our National Parks our working hard to become "living laboratories" to educate students. They have several outstanding educational programs that you can take advantage of. Check out their website at www.nps.gov.



Scholarships for Teachers

The Orion Society is offering $1,000 'Stories in the Land' teaching fellowships to encourage teachers to study local landscape and history, read regional literature, and encourage creative student responses to their home communities. Open to K-12 teachers in Canada and the US. Deadline is August 1, 2001. For an application, contact Education Coordinator, The Orion Society, 195 Main Street, Great Barrington, MA 01230, (413) 528-4422.

Pacific chorus frog on page 1 by Roger Meyer. Pacific chorus frog on page 15 by Ellen Blonder, used courtesy of the California Department of Fish & Game's Wildlife Habitat Relationships Program. All other graphics provided courtesy of Valerie Kells, from *The Natural History of Big Sur.*

Terrain Magazine For Schools

Terrain magazine, published by Berkeley's Ecology Center, is part of a new education program that makes it easy for teachers to bring environmental knowledge to high school and college classrooms at no charge and with no required workshops.

Terrain for Schools offers teachers rich, contextual, current-event material on diverse environmental topics for immediate use in the classroom; and encourages a cross-disciplinary approach to teaching. We provide up to one Terrain per student per mailing along with phone and/or email help in the use of the magazine. We also produce a 12- to 16- page teacher's guide for each issue, including article summaries, a glossary, lesson plans, activity tips, additional resources, and discussion topics.

With its reputation for reliable information, in-depth coverage of issues, and accessible style, Terrain has become increasingly recognized as a valuable tool for environmental education.

For more information, please call (510) 548-2220 x232 or email to schools@ecologycenter.org.

Mandarin, Anyone?

Shin-Roie Lee, who teaches Mandarin to first-grade students,would like to work with someone to translate gardening materials. If you are interested, or have access to already translated materials, please call Shin-Roie Lee at (510) 622-2376 days or (925) 736-1847 evenings and weekends.

Watching Our Watersheds News is published by the Aquatic Outreach Institute.

Editor: Kathy Kramer and Anne Hayes
Contributing Writers: Shannah Anderson, Charlotte Bell, Johanna Brandriff, Kat Gullo, Joan Kerlinger, Lisa Lacabanne, Sharyl McGrew, Tony Reiber and Apple Szostak
Design and Layout: Apple Szostak

Articles submitted for publication will be edited by AOI staff. To contribute an article, artwork, other information, or to help produce the newsletter, contact: WOW Newsletter, c/o Aquatic Outreach Institute, 1327 South 46th Street #155, Richmond, CA, 94804, 510-231-5655, *staff@aoinstitute.org.*

Check Out These Fantastic Websites from Local Teachers

✦ **Wood Rose Academy Garden Project**
http://www.woodroseacademy.orgGardenProject.html

✦ **Brentwood Elementary - Ms. Lund's First Grade Class Garden Project**
http://www.brentwood.k12.ca.us/brentwood/Teachers/lund/ClassProjects.html

✦ **Mira Vista Garden Project**
http://www.tbns.net/omegajim/MiraVista/index.htm

✦ **Student Watershed Projects in Fremont**
http://www.msnucleus.org/watersheds/env.html

Fresh, Organic (& Cheap) Veggies

Riverdog Farm invites you to participate in their Community Supported Agriculture (CSA) program. Through the CSA, Riverdog provides subscribers with organic, freshly-picked seasonal produce and the farm gains a secure outlet for its veggies.

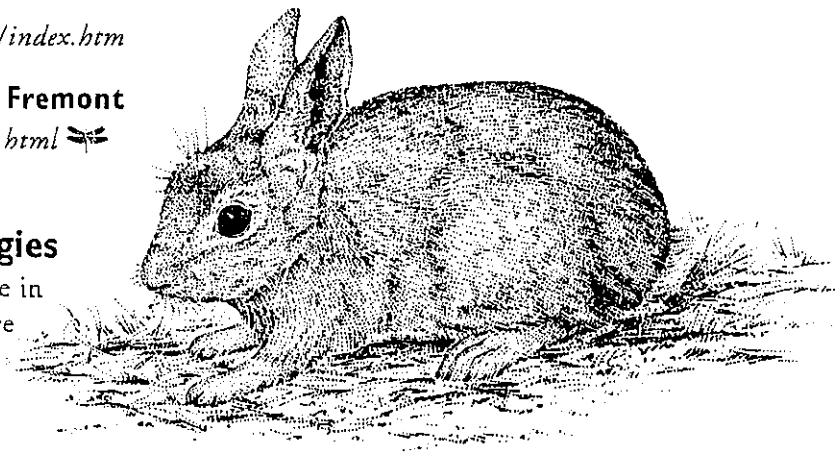
Riverdog delivers Veggie Boxes to Oakland, Berkeley, El Sobrante, Novato, San Rafael, Yountville, St. Helena and Napa. Each delivery arrives on Wednesday afternoon and costs $14. The harvest varies according to the season and the weather, and therefore so does the content of the Veggie Boxes. Summertime boxes are full of tomatoes, eggplant, peppers, melons, garlic, cucumbers, stone fruit, basil, summer squash and/or corn. During cooler weather we fill boxes with lettuce, potatoes, broccoli, cauliflower, leeks, winter squash, beets, sugar snap peas, spring onions, and greens, such as kale, chard and collars. Every Veggie Box contains about seven to nine items, including fruit, occasionally, and a newsletter with news from the farm, storage tips and recipes for that weeks' produce.

To get more information about Riverdog Veggie Boxes and drop-off sites near you, contact the Farm at (530) 796-3802, riverdog@yolo.com or PO Box 42, Guinda 95637.

Editors Note: A number of AOI's staff have been subscribers for years, and we love our Riverdog boxes! If you like vegetables and enjoy cooking, we encourage you to try this out.

Visit AOI on the Web at http://www.aoinstitute.org/

Be sure to check out our web site, which includes information on upcoming programs and workshops. Now you can download registration forms directly from our site and mail them to us. As we continue to improve our site, AOI would like to include links to classroom web sites. If you would like your website included, contact Scott Weintraub at (510) 231-9547 or *scott@aoinstitute.org* with the URL.



Environmental Science and the Standards: A Workshop for Teachers of Grades 6-12

This workshop for Grade 6-12 teachers how toxicology and environmental health science concepts mesh easily with the state and national science standards and provide exciting learning opportunities for students.

Substitute teacher reimbursement, copies of nationally recognized curriculum materials, establishment of relationships with toxicology mentors, lunch, and door prizes are benefits of attendance at previous workshops.

More information will be available at http://*www.toxicology.org* (follow links to Education then to K-12). You will also find a recruitment brochure available as a printable pdf file.

To receive the workshop registration materials, please provide your name, school, mailing address, school phone, FAX, and email address to Linda Roberts, local SOT representative, by E-mail: lgro@chevron.com, fax: (510) 242-7022, or mail: Linda Roberts, CRTC, P.O. Box 1627, Richmond, CA 94802-0627.

Free Classroom Materials Available

Charlotte Bell, AOI Intern

The Aquatic Outreach Institute has been the fortunate recipient of many wonderful classroom materials. We would like to pass these on to people who can put them to good use in the classroom. If you are searching for workbooks, maps, or inserts to help teach your students about water conservation, marine and freshwater aquatic organisms, stormwater runoff or almost anything covered in the *Kids in Gardens* and *Kids in Creeks* workshops, please read on. Below is a small sampling of the materials that AOI has available. Please call (510) 231-5655 if you are interested in reviewing or picking up any of the materials listed below.

Captain Hydro: A Water Conservation Workbook

This workbook is written for 6th grade, but could be adapted to other grade levels. It introduces the water cycle and explains how water is used, as well as how wastewater is treated. Then, it describes what your class can do to better understand how residential and industrial areas use water, and how to measure water quality. The workbook also contains lessons in which students create solutions to common water resource issues such as water shortages, and the use of dams to reroute water. I find this book particularly interesting because it is interactive and contains lots of useful pictures, especially the ones diagramming water treatment. *Classroom sets available.*

Marine and Coastal Education Resources Directory: San Francisco and Monterey Bay Areas, 1996 edition

This directory lists educational resources for all the Bay Area counties. It can be used in two ways. If you have a need for a particular resource, you can look for an organization in your county which has that resource. Or, you can look up an organization you are interested in, and find out what programs they offer. Resources available range from educational materials to speakers and traveling outreach programs. This is a very useful summary of the available resources for teachers.

Delta Atlas, Sacramento and San Joaquin, 1995

This is a good resource for anyone who needs detailed maps of the Delta. The atlas contains maps which show population, recreation, constructed waterways, flooding and flood control measures, utilities and districts of legal agencies. It also includes information on population growth and statutes affecting the delta. This is a revision of the 1987 version.

Have a great idea for school gardens or creek studies? Looking for funding? Check out these grant program websites:

Contra Costa County Waste Reduction Mini-Grants—http://www.wastediversion.org/grant.htm

Alameda County Waste Managment Grants—http://www.stopwaste.org/fsfunding.html

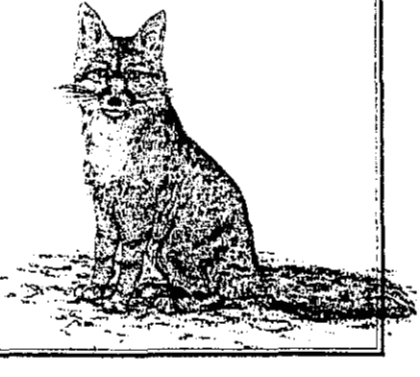
East Bay Community Foundation—http://www.eastbaycf.org/grantmaking/index.html

National Wildlife Foundation Fundraising Site
http://www.nwf.org/habitats/schoolyard/basics/fundraising.cfm

National Gardening Association Youth Garden Grants
http://www.kidsgardening.com/grants

Alameda Countywide Clean Water Program Community Stewardship Grants—http://www.aoinstitute.org

Contra Costa Clean Water Program Teacher Action Grants (for AOI workshop alumni only)—http://www.aoinstitute.org



Upcoming Workshops from the Aquatic Outreach Institute

Kids in Gardens
Saturdays, September 29 & October 6, 2001
For Alameda County educators
Fruitvale Elementary in Oakland

SORRY, FULL

Watching Our Watersheds for Grades 6-12
Saturdays, September 29 and October 13, 2001
For Contra Costa County educators
Delta Vista Middle School, Oakley and Pittsburg High School, Pittsburg

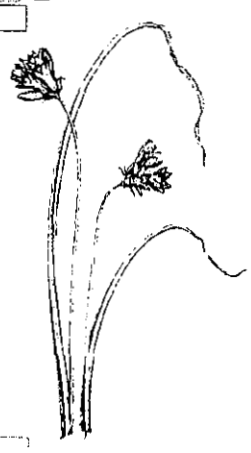
Watching Our Watersheds for Grades 6-12
Saturdays, October 20 & 27, 2001
For Santa Clara County educators
Coyote Hellyer County Park and Hacienda Science Magnet, San Jose

Watching Our Watersheds for Grades 6-12
Saturdays, November 3 & 10, 2001
For Alameda County educators
Location TBA

Participants in both the *Kids in Gardens* and the *Watching Our Watersheds* workshops receive a curriculum guide and extensive resource materials. Academic credit for the workshops is available through California State University, Hayward, for an additional fee. Workshops cost $25 per person. Pre-registration is required. **Workshop participants who attend both days will be eligible for a $150 stipend upon completion of an action project.**

In the action-oriented two day *Watching Our Watersheds* workshops, newly adapted for grades 6-12, participants will learn how to plan cross-curricular environmental activities that improve the health of our watersheds. Participants will also learn how to conduct surveys to detect pollution problems and change the behaviors associated with them, explore a creek for invertebrates, learn the principles of integrated pest management, and make a green cleaning kit. Emphasis is placed on assisting teachers develop action projects that educate students and the community about the need to reduce the use of pesticides, herbicides, and household hazardous waste. Participants will be eligible to apply for grant funds to help your class carry out an action project. For more information contact Lisa Lacabanne of AOI at (510) 231-5783 or go to AOI's website at www.aoinstitute.org.

Kids in Gardens is a two-day workshop that offers educators an opportunity to engage in hands-on activities to learn the skills and techniques to create healthy, organic, low-maintenance gardens; propagate native plants for wildlife habitat; attract beneficial insects; compost yard and household waste; and garden with less water. Participants will also create worm bins that demonstrate natural cycles of decay and regeneration, learn how to attract beneficial insects and birds, design garden journals and many other exciting activities. Due to high demand, *Kids in Gardens* will be offered again next spring in Alameda and Contra Costa counties. For information, please contact Tamara Shulman at (510) 231-9493 or check out www.aoinstitute.org.



New for Educators and the General Public

Habitat Stewards: Learn to Garden for Wildlife!

Habitat Stewards is open to residents of Alameda County with an interest in native plants, local wildlife, and contributing to the restoration and beautification of local neighborhoods. Participants will learn how to create a wildlife habitat garden using California native plants; how to involve students, teachers, and the community in beautifying their school or neighborhood. In exchange for 24 hours of free training, including field trips to local sites, Habitat Stewards volunteer 50 hours at a local school or community garden. A session will be held in August 2001. (Workshop schedule: August 9 & 21 from 6–9 P.M. and August 11 & 18 from 9 A.M.–4:30 P.M.). For more information, please call the Aquatic Outreach Institute at 231-5784 or look at our website: www.aoinstitute.org.

Teaching Environmental Stewardship

by Kat GulloThe Girls' Middle School, Mountain View, CA

Education is more than just teaching children to be able to add sums, write a sentence, identify body parts or learn how to type. Educating a child is the first step to helping them become active and involved citizens. One of the most important acts of citizenship is learning how to function as a good steward of things: objects, each other, relationships and the world in which we live. As Baba Dioum says, preservation starts with educating kids to care about what happens around them.

> *In the end,*
> *We will preserve only what we love,*
> *We will love only what we understand,*
> *And we will understand only what we are taught.*
> *Baba Dioum, conservationist from Senegal.*

Additionally, a goal of many educators is to teach a child the power of individual actions. Teaching children about non-point pollution is an ideal lesson because it emphasizes the power of such individual actions in the aggregate. One reason non-point pollution is such an ideal topic for lessons of individual action is because non-point pollution (also known as urban runoff) is the pollution that occurs from water flowing over urbanized areas. As the water flows through watersheds where there is excess pavement (or development in general), it carries a variety of household pollutants into creeks or streams and from there into the Bay (or ocean or lake, depending on where your watershed drains). The "household" pollutants most often come from motor vehicles, household and garden chemicals or from excess soil. If it were only the detritus from one individual, the effects would not be as damaging. But in aggregate, the combined effluvia of our lifestyles has a dramatic effect on the health of the creek ecosystems as well as the ecosystem of where the watershed ultimately drains (in our case, the San Francisco Bay). In fact, what is amazing is that much of the pollution affecting the Bay is not from industrial sources dumping waste, but from each individual.

What's interesting is that small changes in our lifestyles, for example making sure a car runs well and doesn't leak fluids or using biodegradable cleaners in lieu of ammonia or bleach, can have a large positive impact on the environment. Therefore, teaching kids about pollution and the impact they have on the environment is aligned with a teaching goal of talking about personal responsibility.

Classroom Activities

There are several activities that I have used to teach children about their watershed and how to act as a good steward of this special ecosystem. Our water project started with a definition of what watersheds are. We made handmade watersheds out of crumpled paper. We also talked about urban runoff and how eventually, everything either drains the Bay or is filtered through the water table. We brainstormed ways to lower the impact of urban runoff by altering our lifestyles. We started with practicing water testing. We discussed what a healthy creek would be like and how tests for dissolved oxygen, pH, temperature, and phosphates indicate the test of the creek. Then we had a chance to test the water quality of Stevens Creek near the source.

At the same time we searched for benthic macroinvertebrates. The kids used two-way view boxes to try to classify and identify insects. We talked about pollution tolerance and the health of the creek and how they can serve as indicators of the health of an ecosystem.

After this trip, we spent 3 nights camping in Point Reyes, where we tested the creek water in a similar fashion, as well as tracked animals. We compared the water quality of a creek in a protected National Seashore versus a creek in more urban area. We also wrote poetry about our experiences.

Since returning from Point Reyes, we have done several community projects to highlight the importance of lowering urban runoff. With the assistance of the City of Mountain View, we stenciled storm drains in the neighborhood and also put doorhangers on neighborhood doors.

Most importantly, the students prepared a presentation to teach their

classmates about watersheds. They demonstrated chemical water quality testing, discussed a poster of insects found in a different quality of water and demonstrated the damage of urban runoff with a homemade watershed diorama.

Students used tinfoil and clay to create a hand crumpled diorama. Using brown tempura paint to signify pollution, the students demonstrated to others how pollutants move through a watershed.

Lessons Learned

While I was thrilled with their ability to demonstrate understanding of concepts covered, I was happier that kids felt a real sense of ownership towards their environment. One student said to me, "We always hear about saving the rainforest and I feel like I can't do much to help. But I now feel like I can do a lot to save the Bay." That sense of ownership is the ultimate goal of my program. To further that, we will be incubating steelhead trout in our classroom and releasing them, adopting a storm drain on campus and conducting frequent campus clean ups. I also hope for my students to participate in a school garden.

For me personally, the Aquatic Outreach Institute's *Kid's in Creeks* workshop has been a radical awakening. I feel energized about bringing the outside world into my classroom in such a concrete and real way. I am also amazed at how personally connected my students feel towards preserving our environment. I truly have seen the value of teaching kids to care for the things that are meaningful to them, the things that they will hopefully grow to love.

For more information on this project, contact Kathryn Gullo at kat@girlsms.org.

Poetry In the Garden

Linda Delgado Pelton, a *Kids in Gardens* alumni, asked her class at Crestmont School, in Richmond, to write a garden poem using the following poem recipe:

1. Plant name
2. Plant appearance
3. What have you done for your plant
4. What your plant does for you, creatures, or the earth
5. How it feels to you to work in the garden
6. Botanic plant name

Below is a poem created by her student Aion:

Its real name is Scarlet Monkey Flower
but I call it Ditto because it keeps on spreading
It's beautiful with flowers made of scarlet
It blooms a lot then the flowers fall off
I water and care for the plant
I think I already see it spread
It brings me happiness and gives the world air
it makes the place beautiful
Working in the garden is good, relaxing
funky and fun
Mimulus

Below is a poem created by student Hannah:

Island Sage
Butterflies and hummingbirds
all in the garden
feeding off my plant
with its purple blossoms, so healthy
I feel content, enchanted, in ecstasy
around it
Salvia

To find out more about Linda's Teacher Action Project call her at Manzanita Middle School at 510-232-3300.

IPM CORNER

Integrated pest management is a decision-making process that treats pest problems not as isolated attacks by the enemies of desirable plants, but rather as disruptions of a garden ecosystem. Then, the solution is not just to kill the pest, but to modify the ecosystem in ways that reduce pest damage. And because you, your children, pets, the beneficial insects in your garden, the birds, the groundwater, the air, and the soil are elements of the ecosystem, you will want to choose pest control methods that do not harm or pollute these elements.
—Golden Gate Gardening

KEEPING SNAILS AND SLUGS AT BAY

With the onset of summer, vegetable gardens are in full swing. You may be wondering what has just eaten your seedlings to the ground and made such hideous holes in the leaves of your larger plants. More than likely, snails and slugs are the culprits.

Snails and slugs are mollusks that use a large fleshy foot for locomotion and leave a telltale shiny trail on plants and soil. Our brown garden snail was imported from France in the 1850's as a food source—that's right, these were once a popular delicacy in local restaurants.

These pest's favorite hiding places are in plants with strap-like leaves, on smooth surfaces or fences in the shade, and under flowerpots. Slugs are found in similar places as snails, but prefer moister hiding places, and can creep deeper into moist crevices in the soil.

What is the best way to rid your beautiful garden of these pests? Traditionally, gardeners have used snail bait with the active ingredient metaldehyde in it. But, this kind of pest control masks hidden risks. Young children and pets can be attracted to the small snail bait pellets which are toxic, and may be lethal if ingested. In addition, when snails and slugs eat bait and are then eaten by higher vertebrates, they pass toxins up through the food chain.

EASY SNAIL AND SLUG PREVENTION

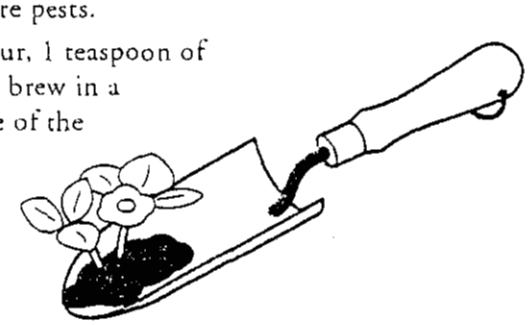
* Plant *transplants* instead of sowing seeds into planter beds.
* Use vegetables that snails find *unappetizing*: Squashes, cucumbers, arugula, cilantro, endive, leeks, New Zealand spinach, parsnips, peppers, prickly pear cactus, salsify, sunchokes, Bolivian sunroot and many perennial herbs.

THE NEXT STEP...

* Make sure that a *thorough general garden cleanup* is done at least once a year. Remove all the snails and slugs that you can find, keep areas free of unwanted weeds, clear leaf litter and debris, take up boards and unused flowerpots.
* *Hand pick* snails and slugs daily from smooth, dry surfaces in the shady spots of the yard. Broad-leaved plants, fences and flowerpots are some favorites. Nighttime forays with a flashlight also work well, because snails and slugs like to feed in the dark. Dead snails and slugs can either be composted or buried in soil, as they make a great fertilizer.

IF PESKY SNAILS AND SLUGS PERSIST...

* You can still conquer the problem! *Set traps.* Effective traps include plastic or unglazed clay flowerpots placed upside down on uneven ground in shady spots, boards with 1" raised runners just up off the ground, moistened soil with black plastic and upside down grapefruit rinds. Just remember, collect your snails and slugs every day and dispose of them promptly, or else they attract more pests.
* *Yeast* is thought to attract snails and slugs. Mix 2 tablespoons of flour, 1 teaspoon of sugar and 1/2 teaspoon of baker's yeast in 2 cups warm water. Set the brew in a shallow saucer or lid and put the container's lip flush with the surface of the soil. Collect and dispose of the snails that are attracted to the yeast.
* Maintain *barriers* to planted areas. Keep overhanging and connecting vegetative bridges trimmed and cleaned so pests have limited access. Dry sawdust paths around plants or garden beds inhibit snail and slug travel. Copper strips or screening around and

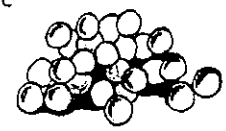


at the base of planted areas, although expensive, are an effective deterrent. The mucous of snails and slugs reacts with copper to shock them.

FUN AND SIMPLE ACTIVITIES WITH KIDS

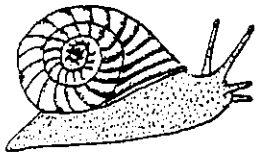
* Go *snail and slug hunting* with kids as often as possible in the garden. Teachers and parents can either compost or bury the snails and slugs. If ducks and chickens are on site, children can feed them snails, watching not to overfeed them!

* Kids can *look for slug and snail eggs* just under the surface of the soil. Snail eggs are round and pearly white and should either be crushed or set out to dry in the sun. Slug eggs are round and translucent.



* Overturned *strawberry baskets* with a stone weight may protect small seedlings from larger snails. These baskets are usually not accepted by neighborhood recycling programs, so ask your students to collect and save them.

* Teachers and students can *observe snail and slug locomotion* by placing them on a sheet of glass and looking from below.



Resources

To find out more about Integrated Pest Management and less-toxic pest control methods:

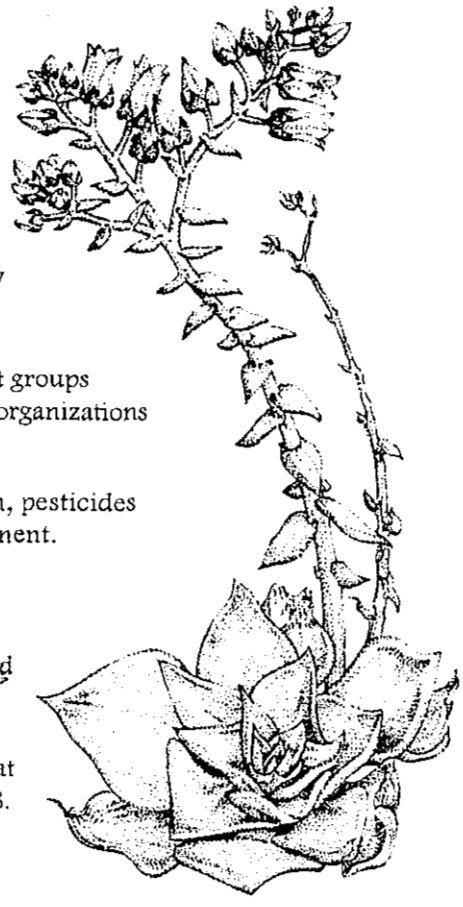
- Bio-integral Resource Center (BIRC): (510) 524-2567
- University of California IPM Website: *www.ipm.ucdavis.edu*
- School IPM Website: *www.ifas.ufl.edu/~schoolipm*
- Biological Control: A Guide to Natural Enemies in North America: Cornell University Website: *http://www.nysaes.cornell.edu/ent/biocontrol/*
- *Golden Gate Gardening: The Complete Guide to Year-Round Food Gardening in the San Francisco Bay Area and Coastal California*, by Pam Peirce. Seattle: Sasquatch Books, 1998.
- *Non-Chemical Snail &Slug Control*, from *For the Gardener*. Center for Agroecology & Sustainable Food Systems, University of California, Santa Cruz.

MAKING AN IMPACT

After participating in *Kids in Gardens* and *Kids in Creeks*, Carol Thompson of Mama Bear's Playcare in Pinole noticed that people washing their cars in their driveways was common site in the neighborhood.

As part of her *Kids in Gardens* stipend project, Ms. Thompson had her pre-K students investigate the effects of washing cars on water quality. Her students made a model about the path of soapy water from driveways to the bay, helped to create and color the doorhangers below, and then distributed them in the neighborhood to alert neighbors to the potential impacts of their activities.

The Alameda Countywide Clean Water Program invites you to apply for a **2001-2002 Community Stewardship Grant**



One of the Alameda Countywide Clean Water Program's goals is to encourage grassroots community action that enhances and protects the health of local watersheds, creeks, and the San Francisco Bay. This year, the Clean Water Program will provide up to $17,500 (up to $1,500 per project) in grant monies to help achieve this goal. The grant money can only be used to cover direct costs (not labor).

Who can apply?

- service clubs
- community groups
- environmental groups
- youth organizations
- teachers/student groups
- other nonprofit organizations

Projects eligible for funding:

All projects must educate about and help reduce the effects of urban runoff pollution, pesticides and herbicides, or household hazardous waste, and contain a public outreach component. Sample projects include:

- watershed outreach and educational projects
- creekside restoration/revegetation projects
- development and distribution of outreach materials (i.e. video, newsletter, brochures, etc.)
- watershed art projects
- wildlife habitat creation
- creative ideas encouraged

Applications are due **July 31, 2001**. Applications may be downloaded from the web at www.aoinstitute.org or by contacting the Aquatic Outreach Institute at (510) 231-5778.

2000-2001 Community Stewardship Grant Recipients

Bay Area Citizens for Creek Restoration

Bay Area Citizens for Creek Restoration will publish a newsletter spotlighting creek stewardship efforts throughout Alameda County. Articles will highlight efforts of local community-based watershed groups, provide information to creekside property owners about California native plants they can use to improve water quality, and list upcoming workshops and educational opportunities for educators and citizens. For more information, contact Shannah Anderson of AOI at (510) 231-5704.

Friends of Five Creeks

Susan Schwartz will take the lead in installing creek-related art, probably tiles created by children (with a graffiti-resistant coating), on the new bridge rail at Cordornices Creek at the Ohlone Greenway. The project will also provide simple signs identifying the creek restoration areas. For more information call Susan at (510) 848-9358.

Friends of the Estuary

Diana Benner will engage children from two classrooms in the San Leandro School District on watershed concepts and factors affecting water quality. The students will take part in a revegetation project at Arrowhead Marsh, and produce a watershed diagram that illustrates how individuals can contribute to improving the water quality of the San Francisco Bay. For more information, contact Diana at (510) 622-2337.

Lake Merrit Institute

Dr. Richard Bailey will provide three large wooden boxes (U-Clean-It Stations) for volunteers to use in removing trash from the Lake. Informational signs will also be created at the Lake stressing the importance of the "No Dumping, Drains to Lake" message. For more information, contact Dr. Bailey at (510) 238-2290.

Millennium High School Integrated Science Class

Clark Smith will be leading his integrated science class in an investigation of the sources of inorganic/organic point and

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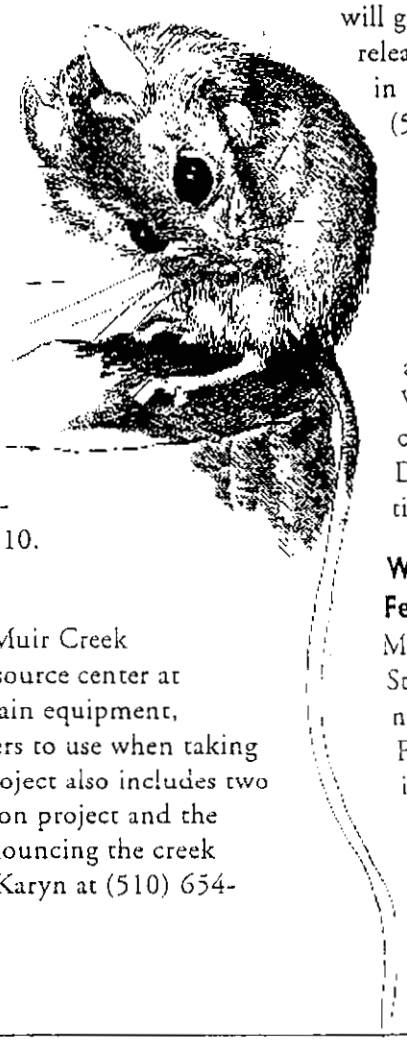
nonpoint source pollution at three sites in Alameda County. The outreach portion of the project includes assisting the Golden Gate Audubon Society in ongoing restoration projects at Martin Luther King Shoreline, and educating local students and residents about the project. For more information contact Clark at (510) 594-2890.



Montessori CEEPERS Club

Jo Ann M. Peters will expand the CEEPERS Club "Only Rain Down the Storm Drain" presentations to pre-K, K and early primary grades. The club will develop three backdrops depicting pollution scenes, purchase or make a "Sammy Salmon" suit and incorporate a recycling and composting component into the presentations. For more information call Jo Ann at (510) 489-7510.

John Muir Creek Supporters

Karyn Ott Smith and the John Muir Creek Supporters will create a creek resource center at John Muir School that will contain equipment, supplies and materials for teachers to use when taking their classes to the creek. The project also includes two creek clean-up days, a revegetation project and the creation of a flyer and video announcing the creek projects. To find out more, call Karyn at (510) 654-8511.

Oakland Releaf

Oakland Releaf, led by Kemba Shakur, will provide creative trainings and activities for local students and juvenile offenders on how to assist in native plant restoration and creek restoration efforts. Participants will grow native plants and create flyers and press releases inviting the general public to participate in the restoration projects. Contact Kemba at (510) 601-9062 for more information.

Oxford Elementary School

Rita Davies and Diana Benner will engage two classes from Oxford Elementary in a riparian restoration project. The project will demonstrate ways to improve water quality and habitat value of the Codonices Creek Watershed by producing a watershed map and chart of water quality measurements. Call Diana at (510) 622-2337 for more information.

Watershed Environmental Poetry Festival

Mark Baldridge used the Community Stewardship Grant to support the interactive nature and art projects at the Watershed Festival held on September 9, 2000. The interactive projects included a Strawberry Creek Restoration Simulation, a creek restoration gallery and environmental education activities. For more information, call Mark at (510) 526-9105.

Special Thanks to the Staff of the University of California Richmond Field Station

The Aquatic Outreach Institute would like to thank the staff of the Richmond Field Station for providing the space, and assisting with the design and implementation of a wildlife habitat garden on the Field Station campus. The garden has been certified by the National Wildlife Federation as a habitat for birds, butterflies, and amphibians because it provides food, shelter, water, and space to raise young through the use of California native plants. The garden has been used as a model for *Kids in Gardens* and *Watching Our Watersheds* workshops, and provides seeds and cuttings for other East Bay native plant demonstration areas. The Field Station staff recently expanded their native plant gardening efforts to a second area of the Richmond Field Station campus in partnership with Michael Thilgen of Four Dimensions Landscape Consultants.

For more information on this wildlife habitat garden, please contact the Aquatic Outreach Institute at (510) 231-5655.

Teacher Action Grants

The Teacher Action Grant (TAG) program is a cooperative program funded by the Contra Costa Clean Water Program and the East Bay Municiple Utility District., and managed by the Aquatic Outreach Institute. By providing seed month to classroom-based environmental studies and restoration projects in Contra Csta County, TAG involves students in hands-on learning and stewardship of local resources. For more infomation, about TAG, contact Tamara Shulman at (510) 231-9493 or visit AOI's website at www.aoinstitute.org.

2000-2001 Teacher Action Grant Recipients

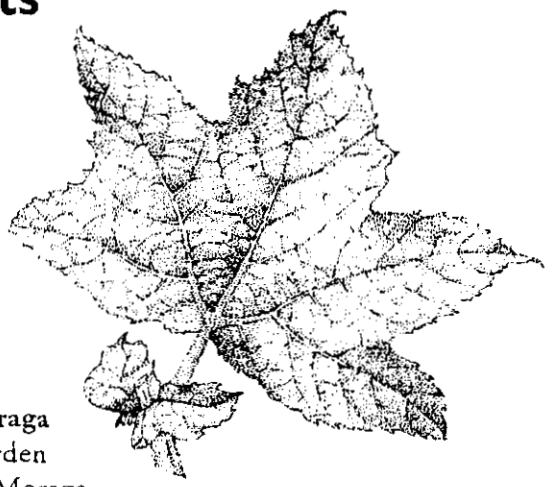
A Butterfly Flutters By....Creation of Monarch Butterfly Habitat at Parkmead A monarch butterfly habitat and observation area will be added to the existing school garden at Parkmead School in Walnut Creek. A solar-powered fountain will be installed in the garden and the school will seek certification as a National Wildlife Federation Schoolyard Habitat. For more information, contact Melanie Perkins at (925) 787-1852.

Butterfly Demonstration Garden The Tassajara 4-H Club at Crow Canyon Institute will develop a Contra Costa native butterfly demonstration garden with interpretive signs, and will also produce fliers about the project to hand out at the gardens. For more information, contact Christine McLaughlin at (925) 875-9151.

Butterfly Garden Expansion The Kindergarten butterfly garden at Buena Vista Elementary in Walnut Creek will be expanded to add California native plants and install a drip irrigation system. Students will publish a brochure identifying local butterflies and beneficial insects found in the garden and distribute brochures to parents. For more information, contact Dave Hauge at (925) 944-6822.

California Native Plant Garden Kensington Elementary 2nd and 3rd graders will transform a neglected garden space into a California native plant garden that attracts birds. Students, with the help of parents, will make a birdbath to provide a water source for the birds, and conduct tours of the garden for other classes and their parents. For more information, contact Susan Billings at (510) 526-6277.

Checking San Pablo Creek for Run-off Pollution First grade students at Bayview School in San Pablo will sample water quality at San Pablo creek after three consecutive rainfalls. Water will be analyzed for chemicals to assess levels of urban runoff pollution. Students will post doorhangers about keeping creeks healthy and ways individuals can reduce runoff pollution. For more information, contact Mary Jane Rampoldi at (510) 237-0363.



Creekside in Moraga The Campus Garden Club at Joaquin Moraga Intermediate School in Moraga will revitalize several garden boxes located alongside a creek that runs through the school. Composting, weeding and trash removal will highlight problems and solutions to urban runoff pollution. For more information, contact Ellen Georgi at (925) 377-4238.

Ellerhorst Pinole Creek Project Ellerhorst Elementary students will measure water quality and conduct surveys of plant and animal life along Pinole Creek. Students will also create a mural and displays about their creeks studies, and develop and distribute a brochure about plants and wildlife found along the creek. For more information, contact Trudi Jensen at (510) 758-1000.

Habitat Demonstration Youth Garden Youth volunteers at the Lindsay Wildlife Museum in Walnut Creek will develop a California native pollinator garden and promote the establishment of backyard wildlife gardens, composting, and integrated pest management. Interpretive signs will be designed and posted in the garden and tours of the garden will be added to the museum's programming. For more information, contact Cassandra Smith at (925) 935-1978.

Kimball Lyon's Jungle Garden Three gardens will be developed at Kimball Elementary School in Antioch: a

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California native plant garden, a sensory garden, and a butterfly garden. Students will develop a web site about their garden projects. For more information, contact Kate Mikula at (925) 706-4130.

Learning Garden 1st through 3rd grade students at Pleasant Hill Elementary will create an organic, water-conserving garden that attracts butterflies and hummingbirds. Students will identify plants, install plant markers identifying the plants and the wildlife they attract, and create a field guide about their gardening efforts. For more information, contact Joyce Kameya at (925) 934-3341.

Native Plant Demonstration Garden Fourth grade students at Buena Vista Elementary in Walnut Creek will identify, plant, and label native plants arranged in various plant communities. Drip irrigation will be installed and mulch will be applied to conserve water. Students will develop a brochure identifying the benefits of gardening with California native plants. For more information, contact Val Hellmann at (925) 938-7909.

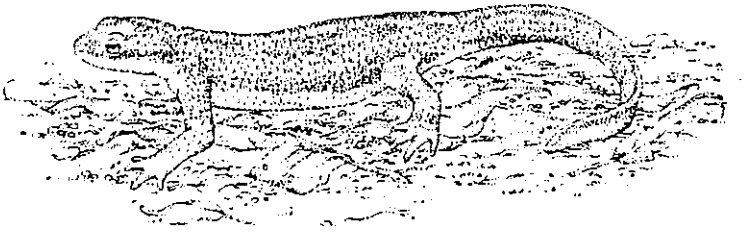
Oral History Outreach and Study of Runoff/Pesticide-Reducing Gardening Practices Fifth grade students at Verde School in Richmond will interview local seniors from the Southern U.S., Laos and Latin America about their organic and water conserving gardening traditions. Students will share their stories with Kindergarten students through puppet shows. Student reports and artwork will be displayed at North Richmond Neighborhood House and students will plant native plants at the local senior center. For more information, contact Cassie Scott at (510) 548-0923.

Organic, Native Plant Butterfly Garden K-4th students at Prospect Sierra School in El Cerrito will develop an organic California native butterfly garden. Students will also develop a brochure about the benefits of California native plants and the relationship between the plants and native butterflies. For more information, contact Philip Gilsenan at (510) 232-4123.

Organic Vegetable Garden The Compost Kids Club at Prospect Sierra School in El Cerrito will establish an organic vegetable garden and study composting and vermicomposting to illustrate the recycling of nutrients. Students will also develop brochures about their project to distribute to parents and the community. For more information, contact Diane Simoneau at (510) 232-4123.

Pine Creek Restoration Project Students at Foothill Middle School in Walnut Creek will continue to monitor six sites in Pine Canyon to study plant, insect and animal life along and in Pine Creek. Students are working with UC Berkeley graduate students to evaluate their data that they have been collecting for seven years. They will continue working on a trail guide and install 17 interpretive plaques along the trail. For more information, contact Jeff Parrish at (925) 939-8600.

Salad to Salad Students at Shannon Elementary in Pinole will create an organic vegetable and herb garden, develop a vermicomposting system in the garden, and gather leftover salad materials from the school cafeteria to compost the green waste and recycle the plastic containers in which they are packaged. For more information, contact Eric Danysh at (510) 724-0943.



Wiley Creek Project Students at DeAnza High School in Richmond will test water quality, conduct habitat evaluations for salmon and trout, remove non-native vegetation and plant California natives along Wiley Creek. Students will also develop interpretive signs along the creek and create a multi-media presentation about their research on urban watersheds and wastewater management. For more information, contact David Krapf at (510) 223-3811.

Wood Rose Academy Garden Education. The existing garden at Wood Rose Academy in Concord will be expanded to include a California native plant garden and composting activities to teach about soil and water conservation. Students will publish information bulletins for their parents and local businesses about water conservation and urban runoff pollution. For more information, contact Gail DeStefano or Devon Holliday at (925) 825-4644.

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2. Think long term

Planting native perennial herbaceous plants and scrubs at the borders of your garden will not only provide aesthetic improvement, but will limit your maintenance and create an established insect habitat. These plants will often survive for years without needing to be replaced. Gardens with bordering habitats contain mini-ecosystems, not only with insects, but other wildlife. Perennial native borders will provide an over-wintering home for beneficial insects which will stabilize the population.

3. Symbiotic benefits

Native plants are host to both beneficial insects and pollinators and have been for thousands of years. Native plants produce nectar and pollen that is more accessible to insects than cultivars (garden plants) and will flower from spring through autumn. Predatory insects also consume pollen when pest insect populations are low.

3. Diversify your garden

The more plant varieties you have in the garden, the greater biodiversity. Your garden should be a living environment, not just for the vegetables, but for insects that will benefit the quality of your garden. The more insects, worms, birds, etc., you have in a garden, the less likely you are to have problems with one dominant pest.

Here are a few suggestions of native plants which are aesthetically pleasing and attract various beneficial insects:

Erigeron glaucus (Seaside Daisy) - This low-growing, purple-flowered perennial is a member of the sunflower family, which is known to attract a plethora of pollinating insects. It flowers from spring through summer with some plants flowering year round. This plant is accustomed to harsh conditions along the coast, so it will tolerate low water, sandy soils and heavy wind.

Mimulus aurantiacus (Sticky Monkey Flower) - This is one of my favorite plants; not just because of the great name, but also because of the brilliant orange flowers which bloom in the dry summer months. Its native habitat is dry coastal scrub with no summer water and poor, clay-like soils on rock outcroppings. This plant is in the snapdragon family, so it can be used in the same context as its cultivar relatives – but with much less water.

Achillea millefolium (Yarrow) - Another species from the sunflower family, yarrow is a compact perennial which tends to spread if space is available and is left alone. Its white-flowered head attracts various beneficial predatory insects, such as the syrphid fly, pirate bug and ladybug. If limited space is a factor, this a great plant to put into small corners or unused spaces.

Baccharis pilularis (Coyote Bush) - Regardless of how you feel about this plant's physical beauty – though beauty is subjective – it attracts a wide variety of insects. Over 50 insects are known to make their habitat among the small, leathery leaves of the coyote bush. In particular, the tachina fly, which feeds on many garden pests, is known to live in conjunction with coyote bush. It is native to coastal California, surviving in some very extreme conditions: poor, rocky soils, a limited amount of water, often just salt spray and sandy soils with more moisture. In late summer or autumn, female plants will set small white flowers to attract pollinators later in the year.

Lupinus arboreus (Yellow Bush Lupine) - This is one of many different species of lupines which thrive in coastal California, from sandy soils to rocky, grasslands. This plant has a brilliant yellow flower (other species have blue or purple flowers) which attracts pollinators when it flowers in the spring. Lupine will take up a significant amount of space turning into a medium to large shrub. The attractive grayish-green, palm-shaped leaves are the signature of this species. From early spring to summer, lupine are covered with pollinating insects.

Purchasing California Natives

Plants can be purchased at plant sales held around the Bay Area by chapters of the California Native Plant Society. Go to their website http://www.cnps.org/ to find more information about the chapter nearest you. The San Francisco League of Urban Gardeners will also have a native plant sale this

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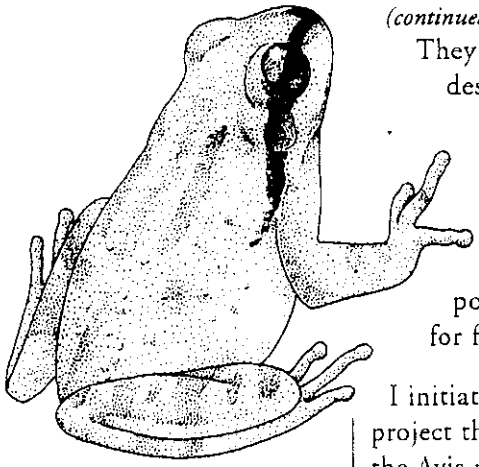

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summer with natives propagated from their nursery at Log Cabin Ranch in La Honda. East Bay gardeners can contact the Native Here Nursery, located in Tilden Park at (510) 549-0211. To request a list of native nurseries near you, call AOI at (510) 231-5778

Reprinted with permission from the Trowel, the newsletter of the San Francisco League of Urban Gardeners (SLUG). To find out more about SLUG's gardening and restoration activities and classes call (415) 285-7584.

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They and the city of El Cerrito designed and installed a beautiful interpretive sign to help educate the school community and the local public about the importance of the pond as a breeding ground for frogs.

I initiated a second restoration project this year for sixth graders at the Avis middle school campus. In the summer of 1999, in an effort to control weeds, the city of El Cerrito dumped many cubic yards of wood chips on the Pacific chorus frog habitat along the Ohlone Greenway at Stockton Avenue. To begin the process of redressing this mistake and restoring the area, Prospect Sierra students applied to the city of El Cerrito for permission to "adopt" this site. Twelve sixth graders showed up at a meeting of the El Cerrito Department of Parks and Recreation to present their case. The commission members were awed by our passionate and articulate kids, and the officials enthusiastically gave us permission and full support to do what was needed to restore the area.

Starting November 1999, the three sixth grade classes dug out the wood chips and exposed the ponds. We then planted California natives in the water and along its edge to provide a place for the frogs to lay their eggs. Starting in February the frogs indeed began laying. We have collected many of those eggs, and are raising the tadpoles in the classroom. This increases the likelihood for the tadpoles' survival into adulthood; the bonus for the students is that they can learn first hand about the development and behavior of this local frog species. Each time we visit our ponds at the Ohlone Greenway, there are more eggs, new sightings of adult frogs, additional plants and an increased diversity of invertebrates. All of this gives us a very real sense of success.

Kathy's kindergartners came to visit the Ohlone Greenway project last February. The sixth graders acted as docents for the children. It was great to see the sixth graders holding hands with the younger kids, displaying ownership of the project while explaining all that they had accomplished. The afternoon ended with a spontaneously created game of the frogs vs. the wood chips. Soon the sixth graders will visit the elementary school site and the kindergartners will be their docents explaining the Tapscott pond project.

To help facilitate these projects, Kathy and I have each received a $1,500 grant from the Aquatic Outreach Institute and the Contra Costa Clean Water Program. These Teacher Action Grants are supplied for the benefit of education and restoration, areas that both of our projects address. In addition, there have been two newspaper articles about the Ohlone Greenway project, in the *San Francisco Chronicle* , and in the El Cerrito *Journal*. We have received donations from the East Bay Vivarium and local residents, and there has been an outpouring of community support.

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Special Thanks to the Department of Pesticide Regulation

The Aquatic Outreach Institute is grateful to the Department of Pesticide Regulation's Urban Initiative–Environmental Education grant program for providing $120,000 to the Aquatic Outreach Institute to carry out the following programs:

- Revise the *Watching Our Watersheds* (WOW) workshop with a focus on grades 6-12.
- Develop *Watching Our Watersheds* workshop binders specific for grades 6-12.
- Hold 4 *Watching Our Watersheds* workshops in the San Francisco Bay Area.
- Publish 2 issues of this newsletter.
- Provide $20,000 in small grants to educators that have participated in the WOW workshops.

DPR has also generously provided a second year of funding to improve and expand the popular *Kids in Gardens* program.

Thanks to Our Workshop Funders

AOI thanks the following organizations and agencies for their support of the *Habitat Stewards, Watching Our Watersheds, Kids in Creeks* and *Kids in Gardens* programs. These programs would not be possible without their support.

Alameda Countywide Clean Water Program
California Department of Pesticide Regulation
Chez Panisse Foundation
The Cities of: Antioch, Concord, Danville, El Cerrito, Martinez, Milpitas, Moraga, Napa, Oakley, Orinda, Pinole, Pittsburg, Richmond, San Jose, San Pablo, Vacaville, and Walnut Creek
City of San Francisco, Department of Parks & Recreation
Contra Costa Central Sanitary District
Contra Costa Clean Water Program
Contra Costa Water District
East Bay Municipal Utility District
Fairfield Suisun Sewer District
Regional Water Quality Control Board
San Francisco Department of the Environment
Santa Clara Valley Urban Runoff Pollution Prevention Program
Solano County Integrated Waste Management
Town of Moraga
Vallejo Storm Water and Flood Control

Watching Our Watersheds News
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